US Army Corps
of Engineers®
Walla Walla District

# Upper Salmon River
# Aquatic Ecosystem Restoration
# Challis, Idaho

# Detailed Project Report and Environmental Assessment

**Authority: Section 206, 1996 Water Resources Development Act**
**Corps Project for Aquatic Ecosystem Restoration**

**October 2004**

**Upper Salmon River**
**Aquatic Ecosystem Restoration**

**Section 206**

**Challis, Idaho**

# Detailed Project Report and Environmental Assessment

Prepared by
U.S. Army Corps of Engineers
Walla Walla District

In cooperation with
Custer Soil and Water Conservation District

October 2004

## SUMMARY


This Detailed Project Report and Environmental Assessment addresses the environmental impacts for a proposed aquatic ecosystem restoration project in Upper Salmon River near Challis, Idaho, located from RM 313 to 325. Dikes and levees, channelization, and riprapping by private landowners, since the late 1800s until present, are all evident in the proposed project reach. Habitat and natural river functioning have been impeded by these human-induced practices since settlement in the valley. Such interference in natural geomorphic processes disrupts channel patterns, which are normally self-developed and self-maintained.

The purpose of the project is to increase the overall fish production in the Upper Salmon River Basin. One of the major goals of the project is to meet specific habitat needs for Snake River spring/summer chinook salmon, steelhead, and bull trout listed under the Endangered Species Act. The purpose of this project is to improve Endangered Species Act fish habitat through habitat improvements in the Round Valley reach of the Upper Salmon River drainage, which would also improve overall habitat for other fish and aquatic species. Chinook salmon use the Round Valley reach of the Salmon River as a holding area for adults and a rearing area for juveniles with a small amount of spawning occurring. Steelhead use the area as a holding area for adults and a rearing area for juveniles with significant spawning occurring within the reach. Bull trout likely pass through the area seasonally, with some adults and juveniles overwintering in the area. In addition to improving habitat conditions for endangered fish, the partners in this restoration effort wish to restore, to the extent possible, natural flood plain functioning to provide a healthy functional river system, which would benefit the entire watershed.

Several alternatives to repair/restore the river habitat system were evaluated. These include:

- No-action.
- Natural evolution.
- Naturalized constructed solution.
- Constructed solution.
- Constrained constructed solution.

The most desirable alternative, called the preferred alternative is selected based on its ability to meet the goals and objectives of the project. The preferred alternative is the naturalized constructed solution. Adverse environmental impacts by the actions are expected to be minor.

The preferred alternative consists of constructing structures, such as secondary channels with rock sill or CMP entrance, logs placed at foot of bank for erosion protection, fish barriers at irrigation outlets, cobble beds, hardened fords/water gaps, vegetative plantings, constructed wetlands, lowering existing dikes, managed grazing plan, and land easement acquisition with fencing. These are the basic tools that may be used to reconnect the flood plain, reduce erosion, promote stream stabilization, and improve water quality within the 12-mile reach of the Upper Salmon River.

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| | |
|---|---|
| APE | area of potential effect |
| BA | Biological Assessment |
| BiOp | Biological Opinion |
| BLM | Bureau of Land Management |
| BMP | best management practice |
| BOR | Bureau of Reclamation |
| BPA | Bonneville Power Administration |
| BURP | Beneficial Use Reconnaissance Project |
| °C | degree Celsius |
| CCWG | Custer County Working Group |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CEQ | Council for Environmental Quality |
| cm | centimeter |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| cy | cubic yard |
| CMP | corrugated metal pipe |
| Corps | U.S. Army Corps of Engineers |
| Council | Northwest Power Planning Council |
| CSWCD | Custer Soil and Water Conservation District |
| CTUIR | Confederated Tribes of the Umatilla Indian Reservation |
| CWA | Clean Water Act |
| DEQ | Idaho Department of Environmental Quality |
| DOE | Department of Energy |
| DPR | Detailed Project Report |
| EA | Environmental Assessment |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| °F | degree Fahrenheit |
| F&W | fish and wildlife |
| FEMA | Federal Emergency Management Agency |
| FIS | Flood Insurance Study |
| FONSI | Finding of No Significant Impact |
| ft | feet |
| fps | feet per second |
| FR | Federal Register |
| FWCA | Fish and Wildlife Coordination Act |
| GMP | Grazing Management Plan |
| HEC | Hydrologic Engineering Center |

| | |
|---|---|
| IDCL | Idaho Department of Commerce and Labor |
| IDFG | Idaho Department of Fish and Game |
| IDL | Idaho Department of Lands |
| IDWR | Idaho Department of Water Resources |
| IMPLAN | Impact Planning Analysis |
| ISCC | Idaho Soil Conservation Commission |
| ISHS | Idaho State Historical Society |
| km | kilometer |
| $km^2$ | square kilometer |
| LAA | likely to adversely affect |
| LERRD | land, easements, rights-of-way, relocation, and disposals |
| mi | mile |
| $mi^2$ | square mile |
| $m^3$ | Cubic meter |
| $m^3/s$ | cubic meter per second |
| mps | meters per second |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| NED | National Economic Development |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NLAA | not likely to adversely affect |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NTU | nephelometric turbidity unit |
| NWP | Nationwide Permit |
| O&M | operation and maintenance |
| ODFW | Oregon Department of Fish and Wildlife |
| OHV | off-highway vehicle |
| PL | Public Law |
| RA | resource area |
| RAS | River Analysis System |
| RCRA | Resource Conservation and Recovery Act |
| REIS | Regional Economic Information System |
| RM | river mile |
| RPA | reasonable and prudent alternative |
| SNRA | Sawtooth National Recreational Area |
| SCNF | Salmon-Challis National Forest |
| SHPO | State Historic Preservation Office |
| SWPPP | Storm Water Pollution Prevention Plan |
| TMDL | total maximum daily load |
| TPI | total personal income |

| | |
|---|---|
| USBC | United States Bureau of Census |
| USBWP | Upper Salmon Basin Watershed Project |
| U.S.C. | United States Code |
| U.S.C.A. | United States Code Annotated |
| USDA | U.S. Department of Agriculture |
| USFS | U.S. Forest Service |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| USRC | Upper Salmon River at Challis |
| UST | underground storage tanks |
| WRDA | Water Resources Development Act |

**Detailed Project Report and Environmental Assessment**
**Upper Salmon River**
**Aquatic Ecosystem Restoration**

# 1.0 INTRODUCTION

This Detailed Project Report (DPR) and Environmental Assessment (EA) considers the potential impacts of implementing measures for restoring portions of the aquatic ecosystem within approximately 12-miles (mi) [19 kilometers (km)] of the Round Valley reach of the Upper Salmon River. The project could include bank stabilization, selective riparian plantings, flow deflection, strategically placed flood plain inundation, opening of blocked or abandoned side channels, and conservation easements. Section 206, of the Water Resources Development Act of 1996 (WRDA 1996), authorizes the proposed U.S. Army Corps of Engineers (Corps) project. Custer Soil and Water Conservation District (CSWCD) is the project's non-Federal cost-sharing sponsor, using Bonneville Power Administration (BPA) funding.

This DPR/EA incorporates, by reference, portions of the BPA Watershed Management Program Final Environmental Impact Statement (EIS) (BPA, 1997), which is a programmatic EIS published by BPA in 1997 (see appendix A). Under the EIS, BPA adopted a set of goals, strategies, and procedural requirements that apply to future BPA-funded watershed management projects. The Corps' project is compatible with the criteria identified in the EIS. Numerous management techniques are available and addressed by the EIS. In general, the EIS considers the management techniques that may be employed by this project in the following categories:

- In-channel modification and habitat improvement.
- Special vegetation treatment.
- Agricultural management – grazing.

The sponsor, with support from the Upper Salmon Basin Watershed Project (USBWP), has demonstrated a strong community commitment towards the continued sustained ecological values of the Salmon River and its resources. The community's values are largely tied to the Salmon River, and the Salmon River is a critical component of the Northwest's salmonid fishery. The USBWP is a technical advisory group to the proposed ecosystem restoration project. Potential cooperators to date include 21 landowners with property along the reach, plus support from U.S. Forest Service (USFS); Bureau of Land Management (BLM); Natural Resources Conservation Service (NRCS); Idaho Department of Fish and Game (IDFG); Idaho Department of Water Resources (IDWR); U.S. Fish and Wildlife Service (USFWS); National Oceanic and Atmospheric Administration (NOAA) Fisheries; and USBWP.

The sponsor is aware of the cost share, real estate, and operational and maintenance requirements, and is agreeable to the requirements of the Section 206 (WRDA 1996) Aquatic Ecosystem Restoration Program. Language in WRDA 2000 authorizes certain technical contributions already completed by the CSWCD to be creditable to the project cost. This project would be the latest of several projects that have been completed in the Upper Salmon River watershed by the sponsor as part of their watershed restoration program funded, in part, by BPA.

This DPR/EA is being prepared to determine if an EIS is needed and to meet the requirements of the National Environmental Policy Act (NEPA) of 1969. The NEPA and subsequent implementing regulations promulgated by the Northwest Power Planning Council (Council) on environmental quality require Federal agencies to evaluate the environmental impacts of proposed Federal actions and prepare written documentation of the analysis. This DPR/EA documents whether the action proposed by the Corps constitutes a . . . major Federal action significantly affecting the quality of the human environment . . . and whether an EIS is required.

The feasibility study process, conducted for Section 206 (WRDA 1996) projects costing more than $1 million in total project cost, was used for project planning and design on this project. The process requires preparation of a DPR as the design decision document. Planning and design elements are performed for the DPR, which includes an independent technical review of the design to ensure a quality project. The project design was a collaborative effort between the Corps, CSWCD, and USBWP, which is represented by local, state, and Federal agencies.

In August of 1997, landowners and members of the USBWP [formerly Custer County Watershed Group (CCWG)], and representatives from various state and Federal agencies and the private sector met in Challis, Idaho, to begin work on a coordinated plan to stabilize a 12-mile reach of the Salmon River. The CCWG was formed when landowners incurred streambank erosion and property losses from high-river flows during the 1996 and 1997 spring runoff periods. The objectives of the CCWG were to help restore and maintain a healthy river corridor; assist landowners in identifying ways to protect their riverfront property; and simplify the process of obtaining stream alteration permits to do the necessary stabilization work. The CCWG identified specific areas along the 12-mile reach in need of bank stabilization and environmental restoration. This plan formed the basis for the Corps’ involvement and development of the project.

Under provisions of the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Act of 1980), BPA protects; mitigates; and enhances fish and wildlife and their habitats affected by the construction and operation of the Federal hydroelectric system in the Columbia River Basin by implementing measures consistent with the Council's Fish and Wildlife (F&W) Program and other purposes of the Act of 1980 [16 United States Code (U.S.C.) 839b(h)(10)(A)]. The mitigation funded by BPA must be "in addition to, not in lieu of, other expenditures authorized or required from other entities under other agreements or provisions of law." Therefore, the mitigation provided by BPA includes only actions that other entities are not required to fund and would not otherwise fund. Under the Act of 1980, BPA has the authority and obligation to fund fish and wildlife mitigation activities that are consistent with the Council's F&W Program and other environmental laws. The initial phase of mitigation planning for anadromous fish habitat losses was submitted to the Council for amendment into the F&W Program in 1989.

The proposed project is consistent with the goals and objectives of the Act of 1980 and the Council's F&W Program. The stream and habitat improvement measures proposed for the project would help to improve overall fish habitat in the Upper Salmon River drainage.

Consistent with Section 704(d)(1) Fish Habitat Improvement Projects on Tributaries to the Salmon and Clearwater Rivers of the Council's F&W Program, BPA proposes to fund this project through the sponsor to help reach the Council's mitigation goals. The Council reviewed the proposed project in 2001 and was in support of the project goals. Some funds were provided to the sponsor to enable data gathering and research efforts within the 12-mile reach and assisted in determining the project’s feasibility. Primary among these efforts was hydrologic modeling conducted by the University of Idaho to help understand how the reach and its associated flood plain responds to various levels of riverflows (see appendix M).

## 1.1 Location

The proposed project is within the 12-mile Round Valley Reach of the Upper Salmon River, between Highway 93 bridge and Bruno’s Bridge in Custer County, Idaho, approximately 2.5 mi (4 km) southeast to 4 mi (6.4 km) northeast of the city of Challis. The city of Challis is located in the central part of Idaho (plate 1) and is about 5,300 feet (ft) [1615 meters (m)] elevation above sea level. The vicinity map is shown on plate 2.

The project work would be located in Township 14 North, Range 19 East, Sections 11, 14, 23, 25, 26, 35 and T13N R19E Sections 3 and 10 (Challis and Bradbury Flat quadrangles); between Latitude 44° 27' 30"N and 44° 33' 00"N, and Longitude 114° 11' 00" and 114° 12' 30"W, which is approximately 10 mi (16 km) upstream from the confluence with the Pahsimeroi River, from river mile (RM) 313 to 325.

## 1.2 Purpose and Need

The 12-mile reach of the Salmon River from the Highway 93 bridge to Bruno's Bridge is dominantly affected by past channel alteration work such as riprapping, diking, irrigation water diversion, construction of homes on the flood plain, and livestock grazing. Other activities occurring upstream, in addition to those mentioned, include mining, timber harvesting, and construction of roads. These activities have indirect and cumulative effects downstream along the entire length of the river.

The purpose of this project is to improve the Endangered Species Act (ESA) fish habitat through habitat improvements in the Upper Salmon River drainage, which would also improve overall habitat for other fish and aquatic species. To accomplish this purpose, the project considered stream and habitat improvement management techniques identified in the BPA Watershed Management Program EIS (BPA, 1997). The project would specifically benefit ESA listed steelhead, and to a lesser extent, chinook salmon, by improving a variety of vital habitat components necessary for salmonid survival in this reach of the Upper Salmon River drainage. These measures would also improve the overall functioning of the local ecosystem by reconnecting areas to the flood plain that were previously cut-off, which would improve the habitat conditions for a wide variety of aquatic species.

## 1.3 Goals and Objectives

The project goal is to restore to the extent possible, a healthy functional river system to meet the needs of salmonids, bull trout, and other aquatic species, while also tailored to meeting the needs of the sponsor and cooperating landowners. The USBWP determined that re-establishment and re-creation of side channel habitat holds some of the most significant and cost-effective potential for enhancing salmonid habitat in the 12-mile reach.

By using commonly used and accepted stream restoration techniques, as outlined in BPA 1997, the Corps believes it can provide high quality rearing areas, areas of refugia for adults and juveniles, and perhaps even some potential suitable spawning habitat primarily through the re-opening of blocked side channels. Some of these side channels would benefit from constant temperature springs as their source, which would not only provide benefits in summer, but could also provide temperature benefit in winter as well. In addition, providing shade over these side channels through planting, re-establishment, and protection of riparian vegetation and by eliminating or significantly reducing and managing grazing along the channel banks would provide additional benefit. In some areas, eliminating or creating improvements at existing fish passage barriers would provide benefits. Allowance of riverflows back into these previously blocked side channels would mimic more closely a naturally functioning flood plain, which brings with it a host of environmental benefits to both aquatic and terrestrial species of fish, wildlife, and plants.

In order to accomplish this goal, the following objectives were identified at the beginning of the design process (not listed in order of importance):

- Improve species-specific habitat conditions through appropriate habitat creation:
  - For each salmonid species and bull trout.
  - For appropriate life-stages/life cycles (salmonid species and bull trout).
  - For aquatic species benefit (other than salmonid species and bull trout).

- Improve related and/or indirect benefits by improving:
  - Water quality (especially temperature improvement).
  - Riparian habitat by protecting the riparian buffer zone.
  - Flood plain reconnection by improving natural ecosystem function.

## 1.4 Constraints

The following constraints were identified by the study team and are not listed in order of importance. Universal constraints for all projects, such as funding, are not listed.

- In-stream work window for construction to protect aquatic species, including ESA listed species (Sept. 1 to March 1 in side channels and Sept. 1 to Jan. 15 in main stem).
- Ability to gain the necessary easement(s) from private landowner.
- Retain channel capacity to handle flood events.
- Risk of project being damaged by high-water event.
- Ability to have a significant affect on main channel habitat conditions due to the large geographic size, the magnitude of flow rate, extent of degradation, and the agreement of the affected private landowners.
- Limiting the extent and capacity of reopened secondary channels to meet landowner requirements.

### 1.5 Project Authority

Section 206 of WRDA 1996 authorized the proposed project. Section 206 limits the Federal contribution to the project to $5 million and requires 65 percent Federal and 35 percent sponsor cost sharing. The WRDA 2000 [Public Law (PL) 106-541] Section 106(b) authorizes credit for work integral to the project, which states the following:

> SALMON RIVER, IDAHO. - The Secretary may credit toward the non-Federal share of the cost of the project for aquatic ecosystem restoration, Salmon River, Idaho, to be carried out under section 206 of the WRDA 1996 (33 U.S.C. 2330) the cost of work (consisting of surveys, studies, and development of technical data) carried out by the non-Federal interest if the Secretary determines that the work is integral to the project.

Of historical note, a Corps flood control project located within the 12-mile reach project boundary was completed in 1958 for a cost of $22,180. The PL 84-685 (1957) and Section 205 of the Flood Control Act of 1948 (PL 80-858) authorized the project. Documentation of the project design and extent could not be located. However, the project is thought to be constructed on the Thornock property, based on discussion with the landowner, who stated the Corps constructed a project on his property in 1958. The Thornock property is located downstream of the five proposed restoration sites, and the flood control project does not affect the environmental project.

### 1.6 Real Estate

The CSWCD is the non-Federal sponsor for this project. The project area is along an approximately 12-mile reach of the Upper Salmon River, near Challis, in Custer County, Idaho. The upland property use through this area is agriculturally oriented and it is anticipated that approximately 21 private landowners are located within the project boundary. Five sites are identified on plate 3, where landowners have expressed willingness to support the proposed restoration measures for their property. The total estimated easement area comprises approximately 506 acres, which does not include temporary construction or access easements.

An aquatic ecosystem restoration easement is required to provide right of way in, on, and across the property owner's land. Constructed fence boundaries and ecosystem restoration boundaries are the same, except for the Stark property, as noted on the design plate (plate 10). A non-standard perpetual easement estate would be acquired from the affected landowner. Off-project requirements are not anticipated for borrow or disposal, road access, or temporary work areas. The easement would provide for construction activity such as installing corrugated metal pipe (CMP) culverts or structures to divert riverflow into secondary channels, realigning and reshaping the secondary channel and profile in certain areas, installation of stabilizing structures, vegetation, streambank erosion protection, and fencing. The perpetual easement would also provide for either grazing exclusion or grazing management.

The easement would allow CSWCD, as the grantee, to construct, operate, and maintain the project. Prior written consent of the grantee would be required for constructing structures or performing grazing or agricultural activities within the improvement easement property.

The project would also require temporary work area and road easements for most of the privately owned land (see appendix B for breakdown by site). Access for construction and operation and maintenance (O&M) efforts at the project sites would be accomplished by road rights-of-way and would coincide with the term of the easement.

Other real estate considerations include:

- In some areas, the alternatives may increase the flooding frequency of property, within the project boundaries.
- The project sites would be designed to not increase the risk of flooding to any structures located in the flood plain.
- The State of Idaho claims ownership of the riverbed below the ordinary high water line.
- The project reach does not have any known mineral deposits of commercial value, nor is there any known presence of hazardous material.
- Relocations of facilities are not anticipated, and there would be no displacements or resettlements under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (PL 91-646, as amended).

# 2.0 PLAN FORMULATION

## 2.1 Existing Condition Background

The Salmon River flows for 400 mi (644 km) from the headwaters near Galena Summit to its confluence with the Snake River near Whitebird, Idaho. The entire drainage area is 14,000 square miles ($mi^2$) [36259.8 square kilometers ($km^2$)].

The historic development and land use within the project basin are sources of significant sediment for the Salmon River. Many of these activities peaked in the 1940s and 1950s and have significantly declined to the present time. The stretch of river from the Highway 93 bridge to Bruno's Bridge is only one small section of the entire Salmon River drainage. The 12-mile reach of the Salmon River from the Highway 93 bridge to Bruno's Bridge is dominantly affected by past channel alteration work such as riprapping, diking, irrigation water diversion, construction of homes on the flood plain, and livestock grazing. Other activities occurring upstream, in addition to those mentioned, include mining, timber harvesting, and road construction. These activities have indirect and cumulative effects downstream along the entire length of the river.

The discovery of gold in the Salmon River Basin began to draw miners into the Upper Salmon River area by the mid-1800s. Over time, mines were established throughout the basin, but they were first established and more concentrated along the Yankee Fork, a tributary to the Salmon River that enters the Salmon River about 40 mi upstream of the project area. From around 1865 to around 1880, numerous small placer and hydraulic mines operated within the basin. These operations were directly located on the Salmon River or on smaller tributaries and discharged sediment directly to the stream. A large hydraulic mining operation began around 1870 and continued until around 1900. Hard rock mining began to dominate mining operations in the basin by the 1890s. While the hard rock mining did not work directly in the streams, the mill tailings were often situated adjacent to streams.

Timber harvest for mining timbers, structures, and fuel for the mill resulted in large clearcut areas that generated sediment from surface runoff. Other activities in the basin affecting the amount of sediment in runoff include forest harvesting, grazing, and road construction. Clearcutting of the forest occurred around the large mines from the late 1800s to the early 1900s. Timber harvesting on National Forest property within the watershed basin has been relatively small. Since the mid-1970s, the amount of timber harvesting has continued to decrease.

Cattle grazing within the basin coincided with the influx of miners to the region and increased until it peaked in the 1920s. Grazing has continued to decline since that peak. Grazing on National Forest and BLM property, accounts for approximately 36 percent of the total grazing within Custer County.

While timber harvest and grazing activities have decreased and should result in reduced sediment input, the amount of roadway within the basin has increased until the 1990s, when the USFS started to decommission a few of the roads within the National Forest.

Other activities affecting the project reach of the river include a dam, bank protection, and levee construction along the Salmon River. In 1910, a dam across the Salmon River was constructed near the Yankee Fork. This dam was breached in 1934 to allow salmon passage to spawning beds in the Upper Salmon River. A significant section of the dam remains within the channel. Landowners adjacent to the Salmon River have continually battled the floods and loss of their land to the river. Within the project area, the landowners have constructed levees and placed extensive lengths of riprap and barbs to limit the river's potential for flood damage. The approximate amount of levee and bank protection work within the project's length of 77,000 ft (23470 m) is summarized below.

- Levees (one side of channel or other, or both) = 9,000 ft (2743 m) (approximately 12 percent of project length)
- Riprap, barbs, or levees (on one side or the other, or both) = 21,500 ft (6553 m) (typically coincides with levee) (approximately 28 percent of project length)

Interviews conducted with local individuals describe a historic pattern of bank protection construction. The typical scenario is one landowner would construct a barb or series of barbs to protect his property. The installation would have little design basis and often have the unintended consequence of directing the river at the neighboring landowner on the opposite bank downstream. The neighbor on the opposite bank, in return, would install bank protection to protect their property from the new attack. This anecdotal description of past bank protection construction is consistent with conditions observed at the project in which the existing bank protection appears piecemeal and without regard to the natural meander pattern upstream and downstream of the work. Few of the existing bank protection structures have the correct radius of curvature, wave amplitude, *etc.* The pattern of reacting to river attack at specific locations, without consideration of the morphological characteristics and energy dynamics of the entire reach, has resulted in stability problems for adjacent reaches and fueled an ever-increasing amount of bank protection.

In August 1997, landowners, members of the CCWG, representatives from various state and Federal agencies, and the private sector met in Challis to begin work on a coordinated plan to stabilize a 12-mile reach of the Salmon River. The CCWG was formed when landowners incurred streambank erosion and property losses from high-river flows during the 1996 and 1997 spring runoff periods. The objectives of the plan were to help restore and maintain a healthy river corridor; assist landowners in identifying ways to protect their riverfront property; and simplify the process of obtaining stream alteration permits to do the necessary stabilization work.

The CCWG made recommendations in late 1997 after an extensive field review. The 12-mile reach was broken into 7 reaches and 13 stations, which resulted in 33 comments and restoration tasks by the CCWG. A priority system was developed by the CCWG to rank the various needs. The Corps used this information when developing the restoration project goals and objectives. The Corps held a public meeting describing the type of restoration work allowed under the Corps' authority. Initially, eight sites were targeted based on landowners expressing interest in the program. The sites were visited to identify restoration opportunities and constraints posed by each site. A preliminary design alternative was prepared for the landowners to consider for their site. Three of the sites were dropped from consideration due to landowner concerns for increased risk of flooding and unsuitable easement terms and conditions.

## 2.2 Summary of Problems in the Study Area

The following problems were identified by the Corps study team and the CCWG at the beginning of this effort.

### 2.2.1 Geomorphology

- Riprap and fill placed on banks for erosion and flood protection.
- Main stem downcut areas.
- Annual in-water work done at irrigation diversions.
- Unstable, highly erosive streambanks.
- Riverbed armoring.
- Absence of bed mobilization.
- Lack of river braiding and side channels.
- Flood plain disconnected due to main channel downcutting, blockage of side channels, and construction of berms.

### 2.2.2 Biological

- Lack of side channel habitat.
- Lack of riparian habitat and overhanging vegetation.
- Lack of in-stream habitat diversity.
- Lack of shade, large woody debris, or other fish habitat in channel.
- High water temperature in the study reach precludes optimal fish rearing temperatures.

## 2.3 Environmental Restoration Rationale and Approach

The three primary limiting factors for steelhead and salmon in the project reach were identified by the USBWP as high water temperature, limited suitable spawning habitat, and limited suitable rearing habitat. The rationale used in the environmental restoration design, for the available properties, was to address habitat attributes known to be limiting the survival and recovery of ESA listed steelhead and salmon species. The following sections discuss these three limiting factors in greater detail.

**2.3.1. Rearing and Refuge Habitat.** Despite the history of mining, dredging, bank protection, *etc.*, most of the river channel in the project reach has the normal appearance of a large, gravel bedded type of river. The gravel banks of the active channel tend to be non-vegetated and uniform without undercuts, scalloping, or other habitat features. Additionally, there is little or no large woody debris. The lack of large woody debris and other features may not be the consequence of human development in this area. Rather, it may reflect the nature of the granular, non-cohesive bank material to lie on a uniform slope. Due to the nature of the peak flows of this basin [raising water surface levels from 5.5 to 8 ft (1.7 to 2.4 m) for the 67 percent chance (1.5 year) flood event], these flows tend to lift up a fallen tree and sweep it away downstream without providing shallow areas for the root wad to anchor on the bed. Without large woody debris to create turbulence and flow impingement, the bank has a uniform slope without scalloping.

During the annual flood event, the uniform banks result in relatively swift flow along the bank, and the lack of bank irregularity provides few quiet water areas. Consequently, the main channel provides little rearing/refugia for juvenile fish for the duration of the high water period. Abandoned channels, that could potentially provide refugia during high water, are often the areas where the bank protection or the levee construction has blocked off and created relic channels, removing these refuge and rearing opportunities.

**2.3.2 Rearing Water Temperature.** Local IDFG biologists have stated that the optimum water temperature for rearing chinook fry is 11.7 degree Celsius ($^{o}$C) to 15.6 $^{o}$C [53 degree Fahrenheit ($^{o}$F) to 60 $^{o}$F] and for rearing steelhead fry is 12 $^{o}$C to 18 $^{o}$C (53.6 $^{o}$F to 64.4 $^{o}$F). During the summer and fall of 2002, average daily temperatures reached 18 $^{o}$C (64.4 $^{o}$F) with 20-minute spikes of 23 $^{o}$C (73.4 $^{o}$F) on several days (King 2002). While the temperatures in 2002 and prior were not lethal, they exceeded optimal rearing temperatures.

**2.3.3 Spawning Gravel Quality.** Individuals who grew up in Challis and were familiar with salmon spawning in the 1970s and 1980s describe extensive spawning within the project reach until the mid-1980s. Today, few salmon spawn within the project area. The present riverbed within the project reach consists of medium to large cobbles with fines filling the voids of the coarser particles. The size of the bed material and presence of fines makes much of the riverbed less than desirable for spawning. Consequently, most of the project reach has no spawning because spawning adults are attracted to better sites outside the reach or compete for the few sites within the project having good spawning gravels.

The riverbed substrate in most of the project reach may be so large that it does not mobilize during typical flood events. The armor layer inhibits mobilization and results in progressive accumulation of fines in the void spaces between the larger particles. Analysis indicates that the bed is rarely mobilized, which may account for the spawning gravel quality characteristics previously described. The riverbed material size used in the analysis is based upon sampling performed at several bars within the reach. In most locations, a surface armor layer was evident.

A major event that mobilizes the bed would provide plentiful gravels for spawning. The approximately 50-year flood event of 1974 and the approximately 25-year event (4 percent chance) of 1956 scoured banks and formed extensive gravel bars. The plentiful gravel after these types of flood events would provide good substrate for spawning. Analysis of redd locations surveyed in September 2002, show close correlation of spawning within areas of the river where active gravel sorting is occurring. Gravel sorting is the process where eroded material is redeposited as the river velocity decreases from higher flows to lower flows. The heavier larger diameter cobble material is deposited first, followed in succession by smaller and smaller cobbles. The final river velocity at each location determines the size of cobbles that remain to form the riverbed. Lighter materials are carried downstream and deposited in slower velocity locations. Generalized conclusions and detailed description regarding geomorphic behavior is contained in appendix F.

### 2.4 Description of Restoration Measures

The use of bioengineering techniques would be used, to the extent practicable, to restore salmonid habitat quality, reduce unnatural bank erosion, restore natural channel function and associated aquatic, and restore riparian biological processes. This approach would involve development of plans for erosion resistant stream restoration techniques using primarily natural fluvial processes and natural materials. Specific principles that would be utilized are summarized as follows:

- Utilize the natural hydrologic and sediment movement characteristics of the drainage.
- Enhance and ultimately capitalize on the stabilizing effect of healthy native riparian vegetation.
- Re-establish natural channel geometry and balance energy and sediment transport to the point that natural channel adjustments are gradual and are more typical of a stable system.
- Use natural materials, where appropriate, for channel and bank stabilization in high-energy areas.

A list and description of some of the restoration measures (techniques) are identified in BPA 1997, appendix A. Table 2-1 summarizes the list of the measures that were considered during the plan formulation for this project.

**Table 2-1 BPA Watershed Restoration Measures.**

| Technique Name | Technique Number |
|---|---|
| Modeling the Effects of River Channelization | 1.1 |
| Prohibit Further Channelization | 1.2 |
| Restoration of Channelized River and Stream Reaches | 1.3 |
| Pre-implementation Evaluation of Proposed Enhancements | 1.4 |
| Install Grade Control Structures and Check Dams | 1.5 |
| Install Other Complexity Structures | 1.7 |
| Bank Protection Through Vegetation Management | 1.8 |
| Structural Bank Protection Using Bioengineering Methods | 1.9 |
| Structural Bank Protection Using Engineered Structures | 1.10 |
| Remove Debris Functioning as Barriers to Passage | 1.11 |
| Hardened Fords | 1.12 |
| Culvert Removal/Replacement | 1.13 |
| Fish Passage Enhancement – Fishways | 1.15 |
| Spawning Habitat Enhancements | 1.16 |
| Rearing Habitat Enhancements | 1.17 |
| Maintain Healthy Riparian Plant Communities | 2.1 |
| Plant/Protect Conifers in Riparian Areas for Thermal Cover | 2.2 |
| Creation of Wetlands to Provide Near-Channel Habitat and Store Water for Later Use | 2.3 |
| Provide Filter Strips to Catch Sediment and Other Pollutants | 2.4 |
| Avoid Exotic Species | 2.7 |
| Construct Wetland Treatment Systems | 2.8 |

| **Technique Name** | **Technique Number** |
|---|---|
| Acquisition of Sensitive Riparian Resources | 2.15 |
| Water Conveyance: Ditch and Canals | 4.8 |
| Water Conveyance: Pipeline | 4.10 |
| Filter Strip | 4.12 |
| Intake and Return Diversion Screens | 4.23 |
| Protect Springs | 4.24 |
| Hardened Fords for Livestock Crossings of Streams | 5.11 |
| Seasonal Use of Fords and Surface Waters | 5.12 |
| Planned Grazing System | 6.2 |
| Control Grazing Intensity | 6.3 |
| Access: Fencing | 6.10 |
| Access: Trails/Fords at Stream Crossings | 6.11 |
| Critical Area Planting | 6.14 |
| Brush/Weed Management | 6.15 |
| Install Hydraulic Structures at Low Streamflows | 7.2 |
| Minimize Erosion and Sedimentation During Stream Crossing Construction | 7.3 |
| Divert Water Around Construction of Larger Structures | 7.4 |
| Avoid Stream Crossings Outside of Construction Windows | 7.5 |
| Avoid Construction During Inclement Weather | 7.9 |
| Erosion Control and Revegetation at Project Completion | 7.10 |
| Slash Management | 7.11 |

Based on the plan formulation efforts, the table 2-2 identifies 21 restoration techniques were developed and proposed for use in the project. Each of the techniques is numbered according to the subsection number that describes it in further detail following the table.

**Table 2-2 Project Restoration Techniques.**

| Subsection No. | Technique Name |
|---|---|
| 2.4.1 | Constructed Secondary Channel |
| 2.4.2 | Square Orifice Opening in Pipe End Cap for CMP |
| 2.4.3 | Sediment trap basin |
| 2.4.4 | Stone Sill |
| 2.4.5 | Riparian Planting |
| 2.4.6 | Fish Barrier |
| 2.4.7 | Footer Logs |
| 2.4.8 | Willow Layering |
| 2.4.9 | Check Dam Removal |
| 2.4.10 | Separation of Excess Irrigation Water from Natural Stream |
| 2.4.11 | Beneficial Use of Excess Irrigation Water |
| 2.4.12 | Fencing, Hardened Fords, and Water Gaps |
| 2.4.13 | Pipe Arch Replacement for CMPs |
| 2.4.14 | Constructed Riffle/Pools |
| 2.4.15 | Cobble Beds |
| 2.4.16 | Bank Sloping and Bench |
| 2.4.17 | Ecosystem Restoration Easement |
| 2.4.18 | Barb and Sill Structure |
| 2.4.19 | Off-Channel Pools |
| 2.4.20 | French Drain |
| 2.4.21 | Overflow Road Section |

**2.4.1 Constructed Secondary Channel.** The intended use for this technique is to provide refuge for juvenile fish by creating a perennial secondary channel. This technique requires excavation to re-establish the connection of a relic channel with the main stem. A stable channel is developed through an iterative process of assuming a discharge, calculating channel width and plan dimensions, then using a hydraulic model to determine if the water surface and flow for the stream section, plan, and profile are balanced. A square orifice in the CMP (see technique 2.4.2) may be required to restrict secondary channel flow rate. A sediment trap (see technique 2.4.3) may be required to facilitate sediment removal and prevent sediment accumulation in other channel locations. A stone sill (see technique 2.4.4) may be required to prevent sediment from accumulating and blocking the channel entrance. Some excavation of the existing channel bed may be required to remove debris and form a more narrow, deeper channel to provide a minimum 6-inch (15.2 cm) depth for the base flow.

**2.4.2 Square Orifice Opening in Pipe End Cap for CMP.** The intended use for this technique is to regulate flows to less than 40 cubic feet per second (cfs) [1.1 cubic meters per second ($m^3/s$)]. The edges of the orifice are framed with 1-inch-thick (2.5-cm-thick) molding to avoid cutting and injuring fish as they pass through the orifice. The CMP orifice entrance is shown below in figure 2-1 and its design was coordinated with the NOAA Fisheries' engineer.

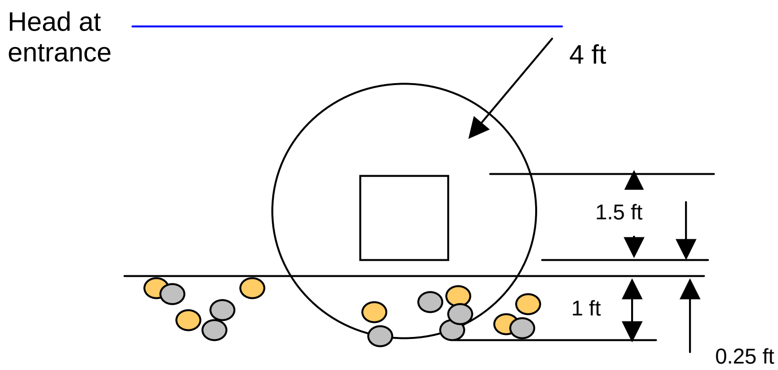



**Figure 2-1 Culvert Entrance with Orifice.**

**2.4.3 Sediment Trap Basin.** The intended use for this technique is to capture sediment at a single location that is easy to maintain and prevent sediment from accumulating in lower reaches of the channel. The trap is constructed downstream of the CMP outlet. The trap slows velocities in the channel and causes much of the sediment to settle. The first 12 ft (3.6 m) of the channel, upstream of the CMP, has a narrower, deeper section to facilitate moving any sediment entering the channel through the CMP and into the trap. The lower 2 ft (0.6 m) of the channel section, downstream of the CMP outlet, is lined with large boulders to allow a near vertical slope in the lower channel section.

**2.4.4 Stone Sill.** The intended use for this technique is to avoid sediment deposition and potential for blocking the secondary channel. A stone sill is constructed at the secondary channel entrance that connects to the main channel. The upstream edge of the entrance is lined with large boulders to form a stone sill. The boulders are set so the elevation of the top of the boulder is about 4 inches [10 centimeters (cm)] above the riverbed as shown in figures 2-2 and 2-3. The boulders' slight projection above the riverbed causes turbulence that keeps sediment scoured out from the secondary channel entrance. Maintenance of sill boulders is required if they are moved out of position during a large flood event.

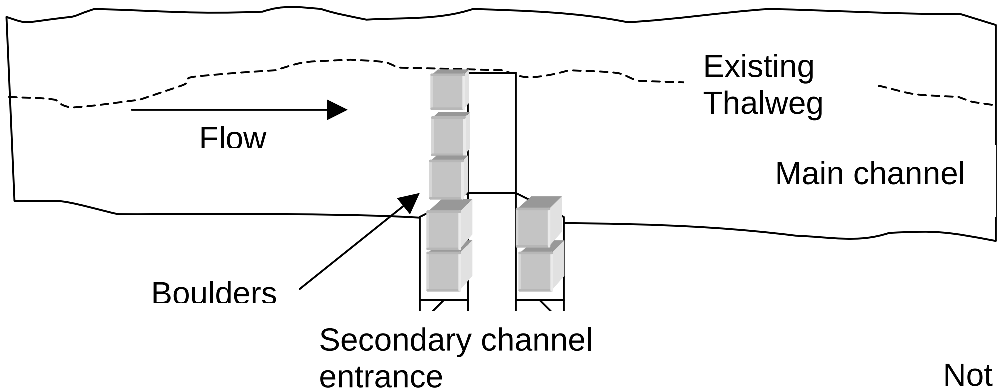



**Figure 2-2 Plan View of Stone Sill.**

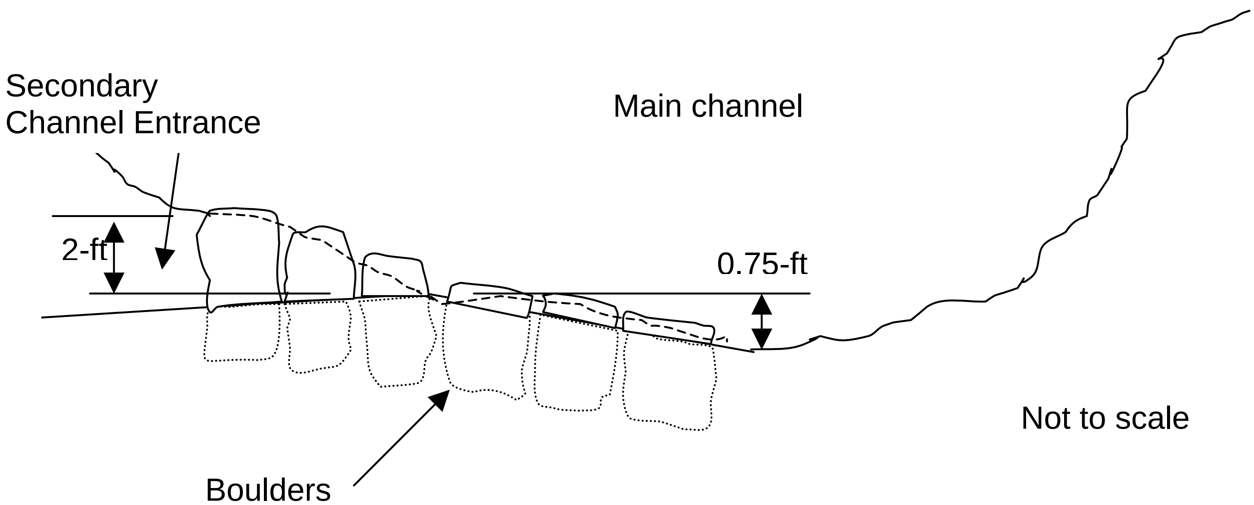



**Figure 2-3 Section View of Stone Sill.**

**2.4.5 Riparian Planting.** The intended use for this technique is to provide cover shade and a filtration barrier for storm water runoff events. Riparian planting may consist of two types of plantings: corridor vegetation along the side of channel or "low-height" vegetation for meadow/pasture areas consisting of shrubs and grasses. The remainder of the areas, not to be planted, are allowed to re-establish riparian vegetation on its own by controlling grazing. Suggested riparian plantings are identified in appendix C, which are used by the USFS on stream restoration projects in the Salmon River Basin and have demonstrated a high survival rate and established robust riparian communities.

**2.4.6 Fish Barrier.** The intended use for this technique is to prevent fish access to the excess irrigation canals that discharge into the river; thereby, avoid stranding fish when the irrigation water is shut off. A structure similar to figure 2-4 is proposed for the project based upon design discussions with the National Marine Fisheries Service's (NMFS) engineer.

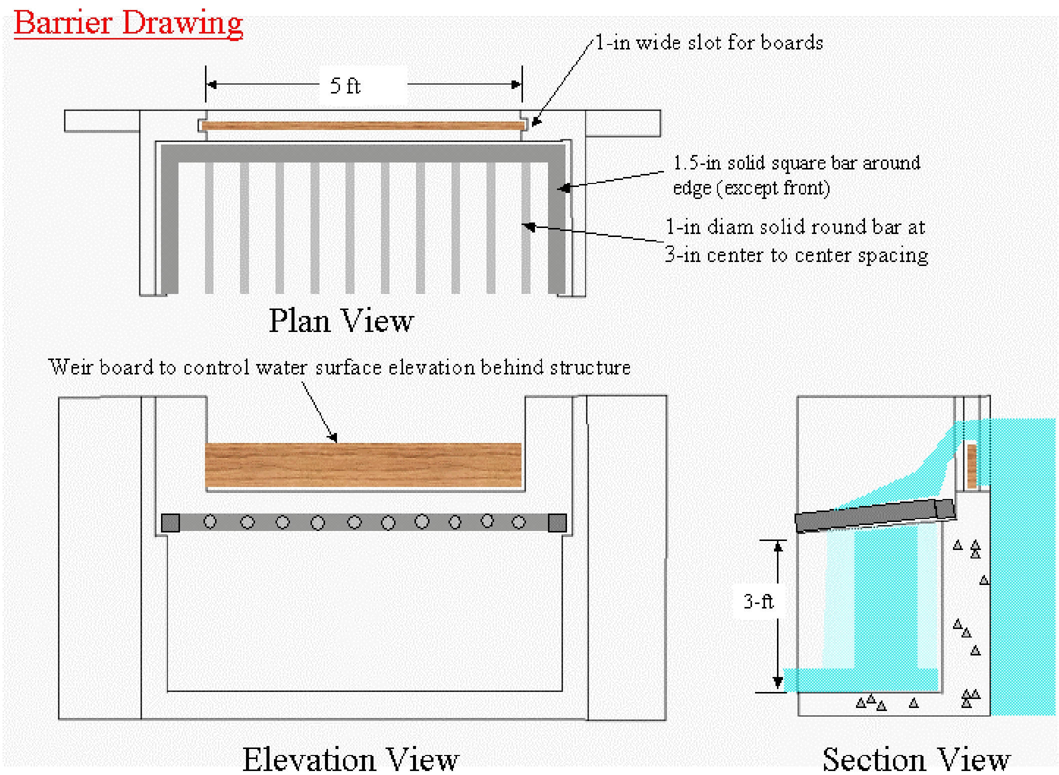



**Figure 2-4 Fish Barrier.**

**2.4.7 Footer Logs.** The intended use for this technique is to provide bank erosion protection. Logs are placed at the toe of the bank, similar to an existing log structure, shown in photo 2-1. The existing log structure located on the Salmon River near Challis has functioned successfully for approximately 5 years. Each log is anchored in place with boulders having a minimum diameter of 4 ft (1.2 m) and placed at 10-ft (3-m) intervals along the length of the log. The slope above the log is stabilized with willow layering (see technique 2.4.8).

**Photo 2-1 Existing Footer Log Toe Protection Structure.**

**2.4.8 Willow Layering.** The intended use for this technique is to prevent erosion by providing protection against direct riverflows. The eroded banks are stabilized by willow layering consisting of rows of willows having approximately 6 cuttings per foot and spaced at approximately 1-ft intervals.

**2.4.9 Check Dam Removal.** The intended use for this technique is to improve fish passage conditions. As seen in photo 2-2, the check dam may create a jump of 3 or more ft (0.91 m). Excavation up and/or downstream is required to reslope and contour the stream channel.

**Photo 2-2 Check Dam Site 3 Spring.**

**2.4.10 Separation of Excess Irrigation Water from Natural Stream.** The intended use for this technique is to improve water quality of a natural stream by discharging excess irrigation return water directly into the river where there is greater mixing flow or using for beneficial use (see technique 2.4.11), such as by creating a wetland.

**2.4.11 Beneficial Use of Excess Irrigation Water.** The intended use for this technique is to reduce the amount of suspended sediment in water. By discharging turbid water into a constructed wetland, particulates are removed by gravity through settling and/or adherence to the films on plants. The wetland is comprised of a distribution chamber, sediment basin, and wetlands treatment cell. Water from the wetland is either discharged to the river or used for irrigation.

**2.4.12 Fencing, Hardened Fords, and Water Gaps.** The intended use for this technique is to protect and establish riparian areas by excluding cattle from grazing. Water gaps are breaks in the fencing where cattle are allowed access to the stream for drinking water.  Hardened fords are required where cattle and/or landowners require access to, or across, the stream.

Stream crossings and stock watering locations are constructed similar to figure 2-5. The streambed and adjacent bank area are excavated and layers of gravel and rock fill placed to provide a stable surface that will not rut, erode, or be a source of turbidity when used.  The rock fill layer consists of angular rocks, which interlock and provide a strong stable surface.  Any voids and unevenness in the surface of the rock, which pose a hazard for cattle walking on the rock fill, are filled with gravel and the surface is compacted and finished to provide a uniform surface for cattle, as well as driving vehicles.

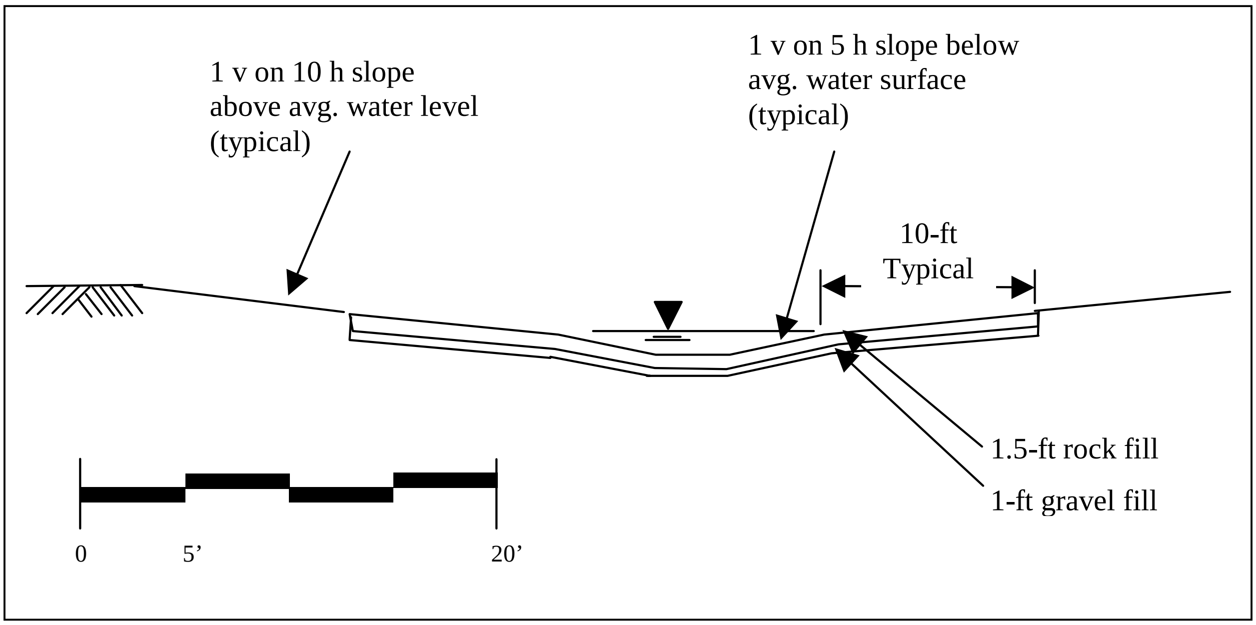



**Figure 2-5  Hardened Ford and Water-Gap Typical Section.**

Fencing is used in locations to exclude cattle from grazing in sensitive riparian areas. Breaks in the fencing are provided, together with hardened fords, to allow limited access to streams for water and crossing.

**2.4.13 Pipe Arch Replacement for CMPs.** The intended use for this technique is to improve fish passage conditions.  A pipe arch is a u-shaped pipe that arches over the stream course and is preferred over a CMP because it allows for a natural streambed. Fish passage problems with CMPs occur when elevated too high, too low, or improperly sloped.  All new pipe arches are to be less than 20 ft (6 m) long and installed per the following NMFS culvert criteria:

- Invert of the culvert is 20 percent of the diameter [use 1 ft (0.3 m)] below the bed of the channel.
- Culvert is installed level (on slope from entrance to exit).

**2.4.14 Constructed Riffle/Pools.** The intended use for this technique is to gravel fill will be placed across the channel so that the water pools to a depth of 3 ft (0.9 m) upstream of the fill. On the downstream side, the fill will be sloped on a 1 vertical on 20 horizontal slope to form a riffle. The material placed into the fill will consist of gravel materials having between 10 and 20 percent passing the No. 200 sieve for the portion of the fill between the subgrade and a point 6 inches (15.2 cm) below the surface of the fill. A 6-inch-thick (15.2-cm-thick) layer of gravel having a maximum size of 3 inches (7.6 cm) and having less than 10 percent passing the No. 200 sieve will be used on the fill surface. This feature is intended to provide an upstream pool that is sufficiently deep to protect the juvenile fish from heron predation. In addition, the pools and riffles created by these features will provide more diversity.

**2.4.15 Cobble Beds.** The intended use for this technique is to provide cover crevices for juvenile fish. The cobble beds consist of a single layer of cobbles that span the channel width and are approximately 20 ft (6 m) long. A 6-inch-thick layer of gravel is placed below the cobbles to prevent fine substrate material from migrating into the voids. The cobbles are uniform in size and range from 6 to 8 inches (15.2 to 20.3 cm) in diameter.

**2.4.16 Bank Sloping and Bench.** The intended use for this technique is to provide a planting area that is well connected to the ground water and stable bank slope that will not be a future erosion problem. The bank is excavated to form a 10-ft-wide (3-m-wide) bench that is approximately 6 to 12 inches (15.2 to 30.5 cm) above the water surface. A 1 vertical on 1.5 horizontal slope is excavated from the bench to the existing ground line.

**2.4.17 Ecosystem Restoration Easement.** The intended use for this technique is to develop and sustain a robust riparian area by restricting land use. The easement does not allow activities that harm the project objectives. However, the sponsor can allow activities that are consistent with the project objectives to benefit salmonid species and are considered to cause no harm. In locations where land is alkaline and more than 3 ft (0.9 m) above the water table, it may be difficult to establish and maintain riparian habitat without irrigation. In this case, the sponsor may negotiate an arrangement with the landowner for irrigation of the riparian area in exchange for some level of grazing that does not harm the riparian vegetation. The Grazing Management Plan (GMP) establishes a process for determining the condition of the riparian area and for evaluating when grazing results have caused harm. The GMP (see appendix D) defines the process for overall management, decisionmaking about grazing limits, and public record requirements. It also describes quantitative survey procedures and establishes the objectives for the riparian areas to benefit salmonid species. The grazing may be considered for portions of the riparian zone outside of the fenced corridor; no grazing is allowed within the fenced corridor.

**2.4.18 Barb and Sill Structure.** The intended use for this technique is to form a pool that provides refuge for juvenile fish. The structure consists of a barb projecting from one bank that is approximately one-third of the channel width and crowds the flow towards the opposite bank. The combination of the barb and sill increases the water velocity and turbulence through the structure and results in the formation of a scour pool immediately downstream and prevents deposition and sediment filling of the pool. The barb forms an angle of 23 degrees with the bank. The barb elevation slopes from the bank to its tip. The toe of the opposite bank is protected with a line of large boulders forming a sill. The root of the barb and the upstream and downstream ends of the sill are embedded a minimum of 5 ft (1.5 m) into the bank to avoid end-around. Both the barb and the sill are 4 ft (1.2 m) below the streambed. The size of the existing gravels in the subsurface are so large that the formation of a natural scour pool would take many years.

**2.4.19 Off-Channel Pools.** The intended use for this technique is to provide refuge habitat for juvenile fish during peak flow events and during low flow periods in the winter. The pool is constructed to be 6 ft (1.8 m) deep at low flow. Locating the pool on the main channel would potentially allow the pool to fill with sediment. Therefore, the pool is located off the channel but supplied by a branch from the channel. In the summer, there might be too little water left in the main channel. Therefore, a source supplied by a french drain (see technique 2.4.20) would be installed to bring water from a point on the secondary channel that is upstream of the pool.

**2.4.20 French Drain.** The intended use for this technique is to provide a source of water during the summer or the winter. The core of the french drain consists of screened cobbles or rock. A gravel filter zone prevents piping fine material into the core material, which could clog the drain. The french drain connection point would be protected from erosion by a rock armor layer covering the channel bank.

**2.4.21 Overflow Road Section.** The intended use for this technique is to provide a road section able to withstand overbank flow when flood flows exceed the capacity of the culvert. The road section consists of rock fill material that is compacted to be tightly interlocked. The surface of the rock is choked with gravel to provide a smooth surface. A trench is excavated and backfilled with rock fill, at the downstream edge of the roadway, to prevent head cutting that would otherwise undermine the rock fill.

## 2.5 Future Without Project

Without the proposed project, the sites would likely remain the same, or their condition would degrade. They would remain subject to many of the past historical activities that have degraded the river system’s natural function, such as the following:

- Riprap and fill placed or left in place on banks.
- Overgrazing of riparian area by cattle.
- Development of property near the river.
- Maintain or create additional blockage to secondary channels.

The effects of these activities continue to:

- Minimize suitable salmonid spawning and rearing habitat.
- Exclude water from secondary channels and reduce the frequency of flood plain connection and inundation.

- Damage the riparian buffer zone, which prevents the containment of cattle waste, fertilizer, and pesticide contaminants and impairs the canopy to shade surface water and reduce water temperatures.
- Subdivide property among additional landowners, which increases the opportunity for negative land uses that would compete with the natural landscape and environment.
- Perpetuate sub-optimal salmonid rearing water temperature conditions.

## 2.6 Restoration Opportunities

Once the primary limiting factors for salmonids in the project reach were identified, the Corps and USBWP collaborated to determine how to most effectively address those limiting factors. These limiting factors (section 2.3) were taken into account when developing the three general project restoration opportunities:

- Improve habitat conditions for salmonids.
- Improve the functioning of the natural flood plain.
- Develop and implement restoration alternatives that are acceptable to landowners.

In order to capitalize on these restoration opportunities, the Corps and USBWP will address the limiting factors also identified in the following specific restoration measures:

- Provide secondary channels and springs that lower water temperatures and provide rearing areas for fry for refugia during high flow periods.
- Provide fish barriers on irrigation returns and withdrawals to prevent fish entry and improve fish survivability.
- Remove levees and other river training structures to increase flooding frequency, where adjacent private property is not threatened.
- Re-establish riparian areas through planting vegetation and grazing exclusion and management.
- Separate irrigation water from natural springs to achieve cooler water temperatures for rearing areas.
- Remove fish passage barriers that block entrance to cool, spring-fed channels.
- Reduce the sediment load by providing bank protection features.
- Increase the flood plain functionality by reconnecting secondary channels and increasing the frequency of overbank events.

The Corps and USBWP developed the above measures/approaches to restoring aquatic habitat in the 12-mile reach. These were predicted to be more successful than trying to implement any type of larger restoration effort in the main stem of the river. This decision resulted primarily because, to address the main stem conditions correctly, the entire 12-mile reach would have to be analyzed, measures prescribed, and landowners amenable to the measures and associated restrictive easements throughout the continuous reach in order to prevent negative impacts on both adjoining and across river properties.

Each site, where landowners expressed an interest in the project goals and objectives, was examined for restoration opportunity potential. Each site was unique, providing individual characteristics that resulted in different combinations and applications of the restoration opportunities. The opportunities that were identified are provided as follows:.

### 2.6.1 Opportunities for Site 1 Dunfee Slough

- Develop a secondary channel to:
  - Provide perennial flows (design for a late summer daily average flow having a 95 percent confidence limit).
  - Reduce water temperatures if possible and provide shade as a minimum.
  - Provide refugia for juveniles from the higher velocities of the main channel by providing reaches of low velocities [less than 2 feet per second (fps)] [0.6 m per second (mps)] during the 67 percent chance exceedance event.
  - Provide feeding areas for juveniles consisting of low velocity reaches that do not require fish to expend much energy to stay in place [less than 2 fps (0.6 mps)] but with flows sufficient to bring plentiful supply of food to juveniles [greater than 3 cfs (0.08 $m^3$/s)].
  - Provide refugia pools for winter freezing of the channel and low velocity area during events that are large enough to result in velocities greater than 2 fps (0.6 mps) in the secondary channel.
  - Provide complex cover consisting of undercut banks, woody debris, *etc.*, for juveniles to avoid predators.
  - Trap sediment at the upstream end to confine sediment to a convenient location for maintenance removal.
- Re-establish riparian vegetation.

### 2.6.2 Opportunities for Site 2 One Mile Island

- Establish the riparian area around the Hannah Slough.
- Re-establish the riparian area on One Mile Island.
- Revegetate eroded, unstable banks.
- Provide suitable salmonid spawning habitat.

### 2.6.3 Opportunities for Site 3 Hot Springs

- Restore Challis Hot Springs Creek and provide conditions favorable for rearing:
  - Block passage into irrigation ditches.
  - Provide NOAA Fisheries-compliant screen for irrigation pump.
  - Remove fish passage barriers and install fish barriers for excess irrigation return systems.
  - Provides cover for juveniles for evasion from predators.
  - Provide better water quality (including cooler temperature).
  - Avoid discharging poor quality irrigation water to the Salmon River main channel.

    - Provide refugia from main channel (low temperature water during summer and slow water velocities during annual peak event).
- Provide a robust and sustainable riparian area:
    - Ensure protection of corridor adjacent to spring
    - Provide diversity in the riparian area to the degree possible.

### 2.6.4 Opportunities for Site 4 Pennal Gulch

- Develop a secondary channel providing:
    - A late summer daily average flow having a 95 percent confidence limit of not being interrupted.
    - A connection to the Salmon River that avoids, to the degree possible, private property.
    - A connection to the Salmon River that avoids, to the degree possible, disturbance of the existing wetlands.
    - A hydrograph that, to the degree possible, reflects the natural hydrograph of the Salmon River.
    - Refugia for juveniles from the higher velocities of the main channel by providing low velocities [less than 2 fps (0.6 mps)] for 30 percent of the total length during the 1.5 year event (67 percent exceedance) and 20 percent of the total length during the 10 year event (10 percent exceedance).
    - Feeding areas for juveniles consisting of low velocity reaches that do not require expending much energy to stay in place [less than 2 fps (0.6 mps)], but flows are sufficient to bring plentiful supply of food to the juveniles.
    - Refugia pools for winter freezing of the channel.
    - Complex cover for juveniles consisting of undercut banks, woody debris, *etc.,* for evasion of predators.
    - Reduced water temperatures if possible and provide shade as a minimum.
    - A sediment trap at the upstream end to confine sediment to a convenient location for maintenance removal.
- Provide a robust and sustainable riparian zone:
    - Reconnect high-flow channels that will provide flood plain inundation and opportunity for developing more diversity.
    - Protect the riparian area from grazing.
    - The landowner requires that the boundary fence have water gaps for stock watering where the project crosses privately owned land.

### 2.6.5 Opportunities for Site 5 Highway 93 Bridge

- Develop a secondary channel with:
    - A late summer daily average flow having a 95 percent confidence limit.
    - A hydrograph that reflects the natural hydrograph of the Salmon River.
    - Unconstrained and dynamic in its response to discharge over time.
    - Refugia for juveniles from the higher water velocities of the main channel by providing reaches of low velocities [less than 2 fps (0.6 mps)] during the 67 percent chance exceedance event.

- Feeding areas for juveniles consisting of low velocity reaches that do not require fish to expend much energy to stay in place [less than 2 fps (0.6 mps)], but flows are sufficient to bring plentiful supply of food for juveniles [greater than 3 cfs (0.08 $m^3$/s)].
    - Refugia pools for winter freezing of the channel and low velocity area during events that are large enough to result in velocities greater than 2 fps (0.6 mps) in the secondary channel.
    - Complex cover for juveniles consisting of undercut banks, woody debris, *etc.,* to evade predators.
    - Shade to reduce water temperatures.
    - Sediment trap at the upstream end to confine sediment to a convenient location for maintenance removal.
- Provide a robust and sustainable riparian zone:
    - Natural hydrograph driven flood plain inundation.
    - Riparian corridor in proximity to water table.

## 2.7 Constraints

The following constraints were identified at each of the project sites.

### 2.7.1 Site 1 Dunfee Slough

- Landowner will not allow secondary channel discharges that exceed 40 cfs (1.1 $m^3$/s) for flood events up to bank full on the Salmon River main channel.
- Restrictions on the height of shrubs, forbs, and grasses in the existing pasture area.
- Landowner wants to minimize the alteration of existing ponds and canals.
- Provide vehicle access across the perennial flow channel established by this project.

### 2.7.2 Site 2 One Mile Island

- Landowner requests to maintain the existing level of grazing, which would require the sponsor to perform a real estate land exchange.
- A portion of the proposed project property on the west side of river has been sold to a new landowner. The restoration plan needs to be presented and accepted by the new landowner.

### 2.7.3 Site 3 Hot Springs

- Landowner requires several pools with depths of 6 ft (1.8 m) on the portion of reconstructed channel within the area of the existing pond.
- Access to the south half of the site is limited to one access road entrance location.
- Landowner will not allow work downstream of pond location.
- Access to the south half of the site is limited to one access road entrance location and cannot use the existing access road that runs past the home.

- Landowner has existing structures within the ecosystem corridor that must remain.
- Landowner will allow a 3-ft-diameter (0.9-m-diameter) gate to divert excess irrigation flows into the channel. The diversion of irrigation flows into the channel will only be allowed when the irrigation water quality is good.
- Landowner will not allow alteration of the geothermal spring to avoid the potential of a thermal barrier near the mouth of Challis Hot Springs Creek.

### 2.7.4 Site 4 Pennal Gulch

- Avoid erosion or flood-related damage on privately owned property.
- Adjacent landowners have established boundary limits that affect riparian corridor widths.
- A small peninsula shaped parcel is affected by the project that is owned by a different private landowner and requires easement acquisition.

### 2.7.5 Site 5 Highway 93 Bridge

- Protect the existing highway embankment from potential flood damage associated with the new channel.
- Allow public access to the existing boat launch ramp.
- Allow public recreation within the site (*e.g.*, walking trails, *etc.*).
- Minimize the sediment deposition problems and reduces long-term maintenance.
- The BLM has specified the location of fence lines for controlling off-highway vehicle (OHV) use of the site and vehicle parking areas.

## 2.8 Ecosystem Benefit Determination

Habitat benefits for the project were determined in appendix E. Table 2-3 identifies the habitat categories and assigned score per acre used for calculating project benefits. The color codes are used to illustrate the assigned project areas that are identified for each site map provided in appendix E.

**Table 2-3 Habitat Benefits Scoring and Identification Table.**

| Score | Color | Description | Code |
|---|---|---|---|
| 9 points per acre | | Riverine Category 1 - Provides water temperatures that are assured to be near optimal. Riparian condition and in-stream habitat conditions may vary over a range from moderate to good with relatively static conditions over the long-term. | Riv 1 |
| 6-10 points per acre | | Riverine Category 2 - Provides a system that is dynamic and regenerative, but water temperatures are uncertain. Good quality habitat that is sustainable over the long-term is provided. At the worst, temperatures may be near those of the main channel with shade from direct sun. At best, the temperatures may be significantly lower than the main channel. | Riv 2 |
| 4-6 points per acre | | Riverine Category 3 - Provides a system in which a riparian zone and full canopy can be developed, but which is relatively static, and water temperatures are uncertain. Flows are constrained in a way that avoids the full range of fluvial processes and will not provide a dynamic regenerative system. At the worst, temperatures may be near those of the main channel with shade from direct sun. At best, the temperatures may be significantly lower than the main channel. | Riv 3 |
| 2 points per acre | | Riverine Category 4 - Clearly less than desirable habitat conditions. | Riv 4 |
| 0.5 points per acre | | Remote Riverine and Wetlands Category - Wetlands not immediately adjacent to the stream bank (greater than approx. 75 feet) and wetlands of any kind. | RR&W |

The following table 2-4 identifies the summary benefits scores for each site. The site average benefit score is used as the benefit value in the cost/benefit computation performed in appendix E.

## Table 2-4 Habitat Benefit Scoring Table by Site and Option.

| Score / acre<br>Property/Site | Riv1 (acres) | Riv1 Score 9 | Riv2 (acres) | Riv2 High Score 10 | Riv2 Low Score 6 | Riv3 (acres) | Riv3 High Score 6 | Riv3 Low Score 4 | Riv4 (acres) | Riv4 Score 2 | RR&W (acres) | RR&W Score 0.5 | Site Ave. Benefit score | Total Acres | Site Ave Benefit score per acre |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Dunfee Slough | 0 | 0 | 0 | 0 | 0 | 14 | 84 | 56 | 11 | 22 | 59 | 29.5 | 121.5 | 84 | 1.4 |
| 2. One Mile Island | 4 | 36 | 27 | 270 | 162 | 0 | 0 | 0 | 32 | 64 | 122 | 61 | 377 | 217 | 2.0 |
| 3. Hot Springs (Hammond) | 7 | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 66 | 66 | 6.6 |
| 3. Hot Springs (Stark) with water gaps | 36 | 324 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 24 | 152 | 76 | 424 | 488 | 2.1 |
| 3. Hot Springs (Stark) with stock trough and pump | 40 | 360 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 16 | 152 | 76 | 452 | 520 | 2.3 |
| 4. Pennal Gulch | 0 | 0 | 0 | 0 | 0 | 17 | 102 | 68 | 0 | 0 | 91 | 45.5 | 130.5 | 108 | 1.2 |
| 5. Hwy 93 Bridge (riprap toe or barb) | 0 | 0 | 5 | 50 | 30 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 43 | 11 | 3.9 |
| 5. Hwy 93 Bridge no barbs and orifice culvert entrance | 0 | 0 | 0 | 0 | 0 | 5 | 30 | 20 | 0 | 0 | 6 | 3 | 28 | 11 | 2.5 |

# 3.0 IDENTIFICATION OF ALTERNATIVES

The following section describes the alternatives that were developed in keeping with the BPA 1997 program objectives, the USBWP recommendations that identified restoration opportunities and specific restoration techniques, and participation by interested landowners. The Corps considered stream restoration alternatives and habitat improvement options in the alternatives analysis to achieve the goals of this project. The "no-action" alternative is presented first and then followed by other alternatives that would require some degree of action to be taken.

## 3.1 Alternative A - No-Action Alternative

The “no-action” alternative would involve leaving the river in its current condition. This alternative would not meet the sponsor and cooperating agencies objective to increase overall fish production. The “no-action” alternative would also not provide for environmental restoration of the riverine system, which is part of the Corps’ existing mission. The alternative would not take any action to help the recovery of steelhead, chinook, and bull trout listed under the ESA. Excess irrigation water would continue to deposit sediment near the point of river re-entry, creating unsuitable spawning and rearing habitat. The excess irrigation water and the storage reservoir at the Hot Springs site would continue to create adverse temperature conditions. No action would be taken to provide for fish passage or to prevent fish from entering irrigation systems. However, other State and Federal programs might be used to address these issues. This alternative assumes that actions such as grazing in the riparian zone, livestock watering in the streambed, manipulating the stream to maintain irrigation withdrawals, and continued streambank armoring would continue to negatively affect the Upper Salmon River aquatic ecosystem through habitat degradation, flood plain disconnection, and reduced water quality. Weed abatement would occur at existing levels as enforced by the local weed abatement authority.

## 3.2 Restoration Alternatives

The restoration alternatives, developed in concert with the sponsor; BPA; and the representatives of the USBWP technical group, are listed and defined in the following paragraphs. The techniques/approaches address ways in which the specific restoration goals can be achieved on the specific properties made available during the process of working with individual cooperating landowners.

**3.2.1 Alternative B - Natural Evolution.** The intent of this alternative is to acquire the exclusive use of shoreline property combined with fence construction that would protect the property from farming, cattle grazing, logging, or other intrusive human impact. By excluding destructive human uses, the stream would be allowed to pursue a natural course and restore itself naturally without in-water construction intervention. This alternative would exclusively use fee title, easement, and/or leasing approaches to specifically acquire and designate property for riparian management. This technique is identified as “Acquisition of Sensitive Riparian Resources” in the BPA 1997 EIS. The acquisition of easements for both public and private sites within the project area would dedicate and protect fish and wildlife values for the term of the easement. Aquatic benefits would be provided based on a timeline driven by natural occurrences. Supplemental planting would not be required. Weed management would be included as a sponsor responsibility under the easement. A prolonged timeframe could be required before aquatic benefits are realized.

**3.2.2 Alternative C - Naturalized Constructed Solution.** The purpose of the alternative is to modify and reconnect the secondary channels, as they were once connected, which would enhance riparian and aquatic ecosystems through more natural flood plain behavior. It would also improve reconnection with the flood plain. Aquatic benefits are provided immediately after construction is completed, in contrast to alternative B, which could take many years, if ever, to provide. Riparian benefits would not be immediate but would develop more quickly because of planting, as compared to alternative B. This alternative would use native material for bank stabilization where water velocities would allow. It would also construct fencing to exclude grazing and employ land use management to control grazing practices.

This alternative would employ, where suitable, many of the techniques identified in table 3-1, which are Available Management Techniques identified in the BPA 1997 EIS. It includes the same acquisition and fencing technique described in alternative B but also includes a number of other constructed techniques identified in section 2.6, which require in-water construction intervention. Native shrub cuttings and seed sources would be obtained within the drainage and grown to container stock to supplement natural seed dependent revegetation. The acquisition of easements for both public and private sites within the project area would dedicate and protect fish and wildlife values for the term of the easement. Weed management would be included as a sponsor responsibility under the easement, and would be required for a shorter period than alternative B.

The project would be divided into three phases to allow for apportionment of the in-water work and would provide additional time for construction work to be done during the limited in-water work window. In addition, project phasing allows for apportionment of the funding over several fiscal years and provides additional time for those project sites that need additional time to negotiate real estate terms. This alternative is further described as the preferred alternative in sections 7.1 through 7.5 and is expected to provide the greatest benefit to ESA listed species in the least amount of time.

**3.2.3 Alternative D - Non-Natural Constructed Solution.** The purpose of this alternative is to modify and reconnect secondary channels and ensure that houses, property, or structures are not damaged by future flood events. It would also improve reconnection with the flood plain. This alternative would exclusively use stone riprap and other non-native materials to provide bank protection, control erosion, and prevent river realignment. This solution is typically employed for the protection of adjacent landowner property. This technique is identified as “Structural Bank Protection Using

Engineered Structures” in the BPA 1997 EIS. Alternative D differs from alternative C in that it would not use native material (*e.g.,* large woody debris and willow plantings) where natural biodegradable materials would be expected to withstand the estimated water velocity of the river, secondary channel, or creek.

In general, this alternative would be more expensive than alternatives A, B, and C, but would also carry less risk of being damaged, which would yield lower maintenance costs. This alternative would construct fencing to exclude grazing and would employ land use management to control grazing practices. Native shrub cuttings and seed sources would be obtained within the drainage and grown to container stock size to supplement natural seed dependent revegetation. Weed management would be included as a sponsor responsibility under the easement and would be required for the same period as alternative C. It would construct secondary channels to improve flood plain connectivity and provide for increased periodic flooding of property.

**3.2.4 Alternative E - Constrained Constructed Solution.** This alternative is similar to alternative D, except it would not construct secondary channels for improved flood plain connectivity. This alternative would attempt to constrain the river into one main channel using levees and maximizing the amount of property that could be put into commercial, agricultural, and/or residential use. Weed management would be included as a sponsor responsibility under the easement. This alternative would address erosion concerns, provide flood protection, and could incorporate the creation of fish habitat into the design of these features. However, it would not provide flood plain reconnection and secondary channel spawning and rearing habitat. Alternative E addresses an approach preferred by some landowners, but is not compatible with the specific restoration goals and objectives, nor does it maximize the biological benefits that can be achieved in the reach.

# 4.0 ALTERNATIVES ANALYSIS

This chapter evaluates the proposed stream restoration alternatives with respect to achieving the project objective and goals, as defined in chapter 1. Those alternatives that are determined to not meet the project objective and goals will not be carried forward for further analysis in the environmental consequences in chapter 6. Table 4-1 is a summary table that compares the features that could be used under each alternative. Not all of the features listed in the table would be constructed at each site.

**Table 4-1 Comparative Features for Each Alternative.**

| Project Features | Alt A No-Action Alternative | Alt B Natural Evolution Solution | Alt C Naturalized Constructed Solution | Alt D Non-Natural Constructed Solution | Alt E Constrained Constructed Solution |
|---|---|---|---|---|---|
| Easement Acquisition | - | X | X | X | X |
| Fencing for grazing control or exclusion | - | X | X | X | X |
| Grazing Management Plan | - | - | X | X | X |
| Construction of fish barriers for excess irrigation and fish passage and survival techniques | - | - | X | X | X |
| Secondary channel reconnection with CMP or rock sill entrance | - | - | X | X | - |
| Increased flooding frequency | - | - | X | X | - |
| Constructed wetland | - | - | X | X | X |
| Cobble beds, hardened cattle gaps | - | - | X | X | X |
| Use of natural materials for bank protection, where feasible | - | - | X | - | - |
| Exclusive use of non-natural materials for flood protection | - | - | - | X | X |
| Separation of excess irrigation water discharge from natural creek | - | - | X | X | X |
| Invasive weed control | X | X | X | X | X |

## 4.1 Screening of Alternatives Based on Project Objectives

The following section contains an evaluation for each alternative to determine whether the alternative is expected to meet the project goals and whether it should be carried forward and further analyzed in the environmental consequences chapter. Project objectives defined in section 1.3 are used for the screening criteria.

**4.1.1 Alternative A** - **No-Action Alternative.** Alternative A would not provide strategic bank stabilization and riparian habitat restoration efforts would not be taken. Alternative A would permit the continuing decline of the Upper Salmon River anadromous and resident salmonid populations and habitat conditions. This would occur due to increased streambank erosion, riverbed downcutting, and continuing water quality degradation. Degradation of water quality conditions would continue to persist through the project area. Further declines in native vegetation, fish, and wildlife populations are predicted. The effort required to control invasive weeds would be greater than alternatives that provide native planting. Selection of alternative A would not meet the project objective and goals and will not be carried forward in the environmental consequences chapter.

**4.1.2 Alternative B - Natural Evolution.** Natural evolution could meet the project objective and goals; however, the timeframe is unknown. Using the natural process relies on annual flood events to reshape and create change. While a 100-year discharge might not be required to naturally reconnect side channels, it could take the river system many years to deconstruct dikes and riprap blocking secondary channels that were constructed in a very short period for flood control protection. In addition, due to the degree of channelization and downcutting that has occurred, the river may not be able to naturally reconnect certain secondary channels.

Excluding or managing cattle grazing would allow riparian habitat to naturally grow and reclaim areas once naturally vegetated. This process would take longer than a constructed solution, because cuttings and plantings would not be actively rooted. The process relies on the natural process of river flooding, plant debris burial, and seed planting by wind, water, and animal movement.

Given that the natural process would take longer to re-establish the riparian corridor, invasive weeds have additional time to become established. While both alternatives B and C would require invasive weed control, alternative B would require control for a longer period until the riparian habitat was fully established. It is unlikely that natural evolution would be able to correct the Hot Springs Site 3 creek as long as excess irrigation water is allowed to discharge into the creek.

In general, the cost of natural evolution is the least expensive of the action alternatives, but the benefits occur much more slowly than compared to a constructed solution. If this alternative were selected, the Corps would require a fee or perpetual easement to provide adequate time for the development of the proposed long-term benefits. The potential environmental consequences of implementing alternative B are discussed further in chapter 6.

**4.1.3 Alternative C - Naturalized Constructed Solution (preferred alternative).** Alternative C would use construction methods, combined with easement acquisition, to reverse the declining Upper Snake River Basin anadromous fish populations. Connecting secondary channels and using other techniques identified in table 3-1 would improve the diversity and long-term quality of salmonid habitat within the project area. One of the primary differences between alternatives B and C is that many of the aquatic benefits of alternative C would be created immediately upon construction. Alternative C would result in measurable increases in streambank stability and water quality conditions, riparian vegetation, and fish and wildlife benefits within a single water year. Short-term, in-water construction impacts are expected. However, the early and long lasting aquatic benefits, provided by the constructed project features, are expected to offset the short-term impacts.

Alternatives B and C would help offset the damage done to anadromous fish habitat as a result of construction of flood control and erosion protection features. Implementation of alternative C would provide immediate benefits to continue the long-term efforts of state, Tribal, and Federal agencies to rebuild anadromous fish populations in the Upper Snake River Basin; increase quality and quantity of juvenile chinook salmon spawning and rearing habitat; and demonstrate the compatibility of fish habitat enhancement with land use management. The potential environmental consequences of implementing alternative C are discussed further in chapter 6.

**4.1.4 Alternative D - Non-Natural Constructed Solution.** This alternative is similar to alternative C, except for the selection of construction material. It would be expected to achieve the project objective and goals. In general, this alternative would be more expensive but would also carry less risk of being damaged, which would yield lower maintenance costs. The use of non-natural construction materials in a natural setting would be aesthetically displeasing. Natural resource agencies might not approve of the design or may require additional mitigation measures to compensate for the loss of aquatic or riparian habitat. Not planting the grazing exclusion area would require more time for the riparian habitat to develop. Invasive weeds would have additional time to develop. As a result, the riparian benefits would be delayed when compared to alternative C. The potential environmental consequences of implementing alternative D are discussed further in chapter 6.

**4.1.5 Alternative E - Constrained Constructed Solution.** Since this alternative would not provide secondary channels, it would not take action to reconnect the flood plain. Spawning and rearing habitat, to improve overall fish production in the Upper Salmon River drainage, could be incorporated into the design of the levees. This alternative might achieve a guarantee that total maximum daily load (TMDL) for sediment would not be exceeded. Due to the non-natural appearance of the alternative, there is no guarantee that all of the landowners within the project reach would participate, leaving some areas vulnerable to erosion. Natural resource agencies would not likely approve of the design, or may require additional mitigation measures to compensate for the loss of aquatic or riparian habitat.

This alternative may ultimately be similar to the no-action alternative. This alternative would continue to negatively affect the Upper Salmon River aquatic ecosystem by not improving reconnection to the flood plain. This alternative does not meet the project objectives and, therefore, will not be carried forward in the chapter 6.

## 4.2 Alternatives Eliminated from Further Evaluation

Alternatives that are not viable alternatives will be excluded from further evaluation. The discussion provided below identifies the rationale used for screening and excluding these alternatives.

**Alternative A** - **No-Action Alternative**
**Alternative E** - **Constrained Constructed Solution**

Since both alternatives would not meet the project objectives and goals, as described in section 4.1, they will be eliminated and, therefore, not carried forward for discussion in chapter 5.

## 4.3 Alternatives Carried Forward

The following alternatives were not screened out and will be carried forward for further analysis and evaluation in chapter 6.

**Alternative B - Natural Evolution Solution**
**Alternative C - Naturalized Constructed Solution**
**Alternative D - Non-Natural Constructed Solution**

# 5.0 EXISTING CONDITIONS

This section is divided into six parts: physical characteristics, environmental resources, cultural resources, human resources, transportation, and utilities. Each part identifies the environmental impact of the alternative considered for further analysis.

## 5.1 Physical Characteristics

The following subjects are described in this section: Physical location, description of proposed project sites, climate, geology, soil, hydrology and flood plain connectivity, and irrigation.

**5.1.1 Physical Location.** The proposed project is within the 12-mile Round Valley reach of the Upper Salmon River, between the Highway 93 bridge and Bruno's Bridge (on Highway 93) in Custer County, Idaho, approximately 2.5 mi (4 km) southeast to 4 mi (6.4 km) northeast of the city of Challis. The city of Challis is located in the central part of Idaho (see plate 1) and is around 5,100 ft (1554 m) elevation above sea level. River elevation through the 12-mile reach ranges from 5,000 ft (1524 m) at the upper elevation Highway 93 bridge to 4,725 ft (1440 m) at Bruno's Bridge.

The lower end of the project area is located approximately 15 mi (24 km) upstream from the confluence with Pahsimeroi River and extends from RM 312 up to RM 325. The proposed project sites are located from RM 319 to RM 325.

The project sites are located in Township 14 North, Range 19 East, Sections 11, 14, 23, 25, 26, 35 and T13N R19E Sections 3 and 10 (Challis and Bradbury Flat quadrangles); between Latitude 44° 27' 30"N and 44° 33' 00"N, and Longitude 114° 11' 00" and 114° 12' 30"W. The quad map of the area is shown on plate 2 and the site locations are shown on plate 3.

**5.1.2 Description of Proposed Project Sites.** The following description of environmental restoration work is organized to coincide with locations denoted on plates 9 though 14, which show the project boundaries for the proposed restoration project. Aerial photography from May 22, 2000, was used as a background for the design plates to provide points of reference and general features to assist in developing the restoration design. Field verification in 2002 and 2003 has found that local conditions are still the same as shown in the aerial photography.

**5.1.2.1 Pennal Gulch Site 4.** An aerial photo of the Pennal Gulch site and proposed project actions is shown in plate 9. The project is located from about RM 318.8 to 319.8 in T14N R19E S14 (Challis quadrangle). The site is located at the end of a long road (locally known as Sportsman's Access), approximately 3 mi (4.8 km) from the Highway 93 that provides hunting and fishing access to the riverbank, adjacent to Pennal Gulch. The area is characterized by a series of channels that are dry at times during the year or may carry irrigation flows. These channels roughly parallel the current main channel, across an area that is from 500 to 1,000 ft (152 to 305 m) wide and is several thousand feet long from the point where the relic channels diverge and rejoin the river channel. The majority of the property is Federal property managed by BLM.

A wetland was formed on the site when an old secondary channel was disconnected from the main stem of the river. Photo 5-1 shows the existing wetland at the site. A bench exists in some locations, at an elevation slightly above the 68 percent chance exceedance (1.5 year) event, which permits connection to the water table for robust riparian growth.

**Photo 5-1 Existing Wetlands (Site 4).**

A sportsman access road from Highway 93 provides access to the site and the river. Where the road parallels the river, it is protected from river erosion by a riprapped berm. The river impinges directly on this berm, and it provides an unknown level of flood protection.

The site contains a network of relic channels that provide year-round flow from combined spring water and excess irrigation water during the irrigation season. The excess irrigation inflow points are remote from the secondary channel location and are not easily distinguished from the springs. Most of these channels are now cut-off by a series of levees but may carry spring water or irrigation water at times during the year. At the upstream end of the site, an approximately 1,000-ft-long (300-m-long) levee channelizes the Salmon River against the hillside to the east. This levee cuts off, what was once, the main channel for the river. At approximately 700 ft (213 m) downstream of the first levee, a second levee cuts-off a second channel and is 250 ft long. The downstream section of the relic channel has two areas of bank erosion from past flood events. The property is currently being grazed and cattle have damaged the riparian buffer zone.

The site contains temporary travel pathways where vehicles may be driven. An existing spoils gravel pit is located just southwest of the project site, near the sewage disposal ponds.

**5.1.2.2 Hot Springs Site 3.** Aerial photos of the Hot Springs project site and proposed project actions are shown in plates 10 and 11. The project site has two private property owners, Stark and Hammond, which comprise the Hot Springs property. The project is located from about RM 320.9 to 321.3 in T14N R19E S23, 25 and 26 (Challis quadrangle). A residence is located on the southern portion of the site, and is grazed and/or planted and harvested for hay. The northern portion of the site is developed for recreation and includes a residence, campground, swimming pool, golf driving range, *etc.* Much of the site has a uniform surface that is dissected by the Challis Hot Springs Creek and its tributaries. The northwest portion of the site contains several relic and high-flow channels. These channels have formed in the area off the main channel and only carry flow during flood conditions. Springs may be observed in relic channels depending upon the time of year and location along the length of the channel. The site has approximately 600 ft (183 m) of levee and 2,600 ft (792 m) of riprap bank protection, which overlap, and several high-flow channels that are cut-off by these structures.

An east and west tributary of Challis Hot Springs Creek and their confluence are located on the southern property (plate 10). Both the east and west creek tributaries are shallow and heron are reported to feed on the small fish that reside in the spring creeks. The east spring creek has excess irrigation water that enters about midsection and there is a 300-ft (91.4-m) vertical bank on both sides on the downstream section. Both east and west tributaries have CMPs that impede fish passage.

A horse stable is located upslope from the main creek channel, which allows the horses access for drinking water. Storm water is also allowed to drain through the area without any riparian buffer protection.

In the spring, or other times of the year when there is excess irrigation, water containing significant sediment enters the spring creek near the owners' property line. See photo 5-2.

**Photo 5-2  Turbid Flow from Excess Irrigation Entering Spring Channel (Site 3).**

Downstream of the irrigation entry location, on the northern owner's property, is a wetland that was originally built in the 1920s as a storage and recreation pond.  A concrete check dam backs up water in the pond and creates an approximate 3-ft-high (0.9-m-high) waterfall creating fish passage.  The pond has filled with an estimated 40,000 cubic yards (cy) [30582 cubic meters ($m^3$)] of sediment since 1977.  The outlet from the pond is a barrier to upstream fish passage and is impassible to small fish in the upstream direction.  Solar heat collected by the pond during the summer raises the spring water temperature (not including the irrigation water) approximately -12.2 $^oC$ (10 $^oF$), raising the water temperature from approximately 14.4 $^oC$ (58 $^oF$) at the upstream end of the pond to 20.5 $^oC$ (69 $^oF$) at the downstream end of the pond.

The vegetation in the existing pond is of minimal quality (includes pond weed and a small amount of duck weed in the open water portion of the pond and nettles and forbs at the banks) and covers an area of 2.4 acres (see photo 5-3).  Downstream from the pond near the Hot Springs facility, there is a water pump intake used for domestic irrigation that does not have a screen that meets NOAA Fisheries' requirements.

**Photo 5-3  Existing Pond (Site 3).**

**5.1.2.3    One Mile Island Site 2.** An aerial photo of the One Mile Island site and proposed project actions is shown in plate 12. The project is located from about RM 322.5 to 323.5 in T14N R19E S35. The island itself is not currently grazed. The landowner currently fords the east channel to access the island, and there are existing pathways for vehicle access within the site. The west side of the island has two locations [400 and 600 ft (122 to 183 m) in length] where the main channel bank has been protected by barbs. Erosion has occurred between the barbs where the impinging flow has eroded the bank at three locations, from 1,200 to 1,700 total linear feet. There are also two locations on the east side of the island, from 1,000 to 1,500 total linear feet, which are lacking adequate bank protection.

**5.1.2.4    Dunfee Slough Site 1.** An aerial photo of the Dunfee Slough site and proposed project actions is shown in plate13. The project is located from about RM 322.7 to 324.7 in T13N R19E S3 (Bradbury Flat quadrangle). The site includes a combination of relic channels (former main channel that was abandoned by the river over time) and constructed channels. The west channel is entirely constructed while the east channel may have been a high-flow channel that was modified by the construction of dams and the excavation to deepen to provide pools. Much of the constructed portion was for aesthetic and recreation purposes. Several existing pools, formed by dams 2 to 4 ft (0.6 to 1.2 m) in height, are located on the property (see photo 5-4).


**Photo 5-4  Existing Pools (Site 1).**

Excess irrigation flows combine with the secondary channel flows, which also pose risk for fish stranding.  Much of the property is currently being grazed and the landowner has plans for homeowner development of the property.  The spillways are rock-armored sections that act as uncontrolled weirs, and the lack of adequate jump pools pose problems for fish passage (see photo 5-5).


**Photo 5-5  Spillway Location in Need of Fish Passage Improvement (Site 1).**

A spoil area (located on plate 15) is located where a naturally formed bench lies between the river flood plain and the terrace above the river.  About 10 years ago, the area was leveled and a basement excavated for a home.  The building was never constructed and the site now serves as a storage area.  Excess material from nearby excavations (for ditches and ponds located on the property and the material removed for the basement) is stockpiled on the bench.  These piles are 8 to 15 ft (2.4 to 4.6 m) high.  The surface of the bench has been periodically smoothed and restored to level to maintain its usefulness as a storage/work area.  It currently has poles, earth material stockpiles, and other items stored at the site.

**5.1.2.5    Highway 93 Bridge Site 5.**  An aerial photo of the Highway 93 bridge site and proposed project actions is shown in plate 9.  The project is located from about RM 324.7 to 324.9 in T13N R19E S10 (Bradbury Flat quadrangle).  The property is managed by BLM and provides a boat launch ramp and access to the river from Highway 93.  A relic river channel exists on the property (see photo 5-6).  Heavy debris blocks the relic channel in the downstream channel segments (see photo 5-7).  The site contains numerous temporary travel pathways where vehicles may be driven, and the property is not grazed.

Borrow excavation and the use of OHV have degraded the value of habitat on the property.  Some of the OHV use has occurred in locations that are not authorized by BLM as vehicle ways, because they disturb sensitive riparian habitat.  There is a box CMP, located near the highway, which provides for storm water drainage from the south side of the highway.

**Photo 5-6  Area in Vicinity of Upstream End of Relic Side Channel (Site 5).**

**Photo 5-7  Area in Vicinity of Downstream End of Relic Side Channel (Site 5).**

**5.1.3 Climate.** Although the study area is about 500 mi (804.7 km) from the Pacific Ocean, the climate of the Upper Salmon River is strongly influenced by maritime airborne eastward on prevailing westerly winds (BLM, 1998). See plate 8 for the geographic boundary of the subbasin. The Aleutian low dominates the weather pattern during the winter months producing cloudiness and precipitation in the form of snow. During the summer, the Pacific high dominates with fair weather, except when moisture-laden air from the Gulf of Mexico and the Caribbean areas is brought in from the south at high altitudes and produces thunderstorms (CCWG, 1998). Cold winters and warm, dry summers characterize the area [Idaho Department of Health and Welfare - Division of Environmental Quality (DEQ), 2003].

The median annual air temperature at Challis is 6.7 $^{o}$C (44.2 $^{o}$F). The normal maximum temperature 13.8 $^{o}$C (57 $^{o}$F), and the normal minimum temperature is -.6 $^{o}$C (30.9 $^{o}$F). The normal annual precipitation is 7.73 inches (19.6 cm). The NOAA bases these statistics on 30 years of weather data compiled. The maximum summer temperatures within the subbasin can exceed 37.7 $^{o}$C (100 $^{o}$F) with a minimum winter temperature dropping below -17.7 $^{o}$C (0 $^{o}$F) (BLM, 1998). The average maximum monthly temperature in Challis is 29.4 $^{o}$C (85 $^{o}$F) and the average monthly minimum is –12.7 $^{o}$C (9 $^{o}$F) (IDC, 2000). Most of the Upper Salmon River region (over 9 million acres) is variable in precipitation and temperature (State of Idaho, 1998). The mean annual precipitation in the Salmon Basin at/upstream of Challis is in the range of approximately 15 to more than 50 inches (38 to 127 cm) per year with the smaller amounts in the lower elevations, and the higher values up in the mountainous portions. Table 5-1 contains summary temperature and precipitation data for Challis and May, Idaho.

**Table 5-1 Temperature and Precipitation Summary Data.**

| | Challis, Idaho | May, Idaho |
|---|---|---|
| Station Number | 101663 | 105685 |
| Period of Record | 1931-1996 | 1948-2003 |
| | **Temperature ($^{o}$F)** | **Temperature ($^{o}$F)** |
| Mean Annual | 44.4 | 42.7 |
| January Mean | 19.9 | 18.4 |
| July Mean | 68.3 | 65.9 |
| Extreme High | 103 (7/26/1964) | 101 (7/10/1973) |
| Extreme Low | -34 (12/23/1983) | -40 (12/23/1983) |
| Precipitation (in.) | | |
| Mean Annual | 7.40 | 7.75 |
| One Day Maximum | 1.85 (7/10/1983) | 1.45 (6/2/1953) |
| Average Total Annual Snowfall | 15.7 | 19.7 |

Information source is the Western Regional Climate Center

Although snowfall accounts for 55 to 60 percent of the precipitation at higher elevations, (*i.e.*, North Fork, mean annual snowpack from 1961 to 1985 was 25 to 30 ft) (7.6 to 9.1 m) lower elevation valleys receive minimal snowpack [less than 9 inches (22.9 cm)

Pahsimeroi/Lemhi valleys]. Most of the precipitation (70 percent Upper Salmon River) falls from November through April (USFS, 1998).

Extremely high and low temperatures occur nearly every year but only persist for a short period (BLM, 1998). Daily freezing and thawing occur during the late fall and early spring months. The frost-free growing season lasts for less than 100 days in the lower elevations. During the winter months, extended durations of extremely cold temperatures may cause water bodies to ice over. Ice buildup within the streams and rivers of the region can cause flooding or severe bank damage as the ice breaks away from the banks (IDEQ, 2001).

Approximately 70 percent of the precipitation falls within the spring and fall seasons (USFWS, 1998). The wettest months occur during April, May, and June, with the driest months occurring during January through March (BLM, 1998). The average annual precipitation in Challis is 7.4 inches (18.8 cm) (IDCL, 2000). Snow depths within the subbasin vary considerably with greater amount of accumulation occurring at the higher elevations. The average annual snowfall in Challis is 15.7 inches (39.9 cm) (IDEQ, 2003).

Diverse snowmelt patterns within the subbasin may cause significant runoff events in early spring through the summer. Snowmelt in the lower reaches of the subbasin begins in early spring while snowmelt in the higher elevations occurs in early to midsummer. The greater snowpack in the higher elevations results in larger streamflow discharge in mid- to late summer. Rain-on-snow events that occur in the spring season also contribute to the increased streamflows (DEQ, 2003).

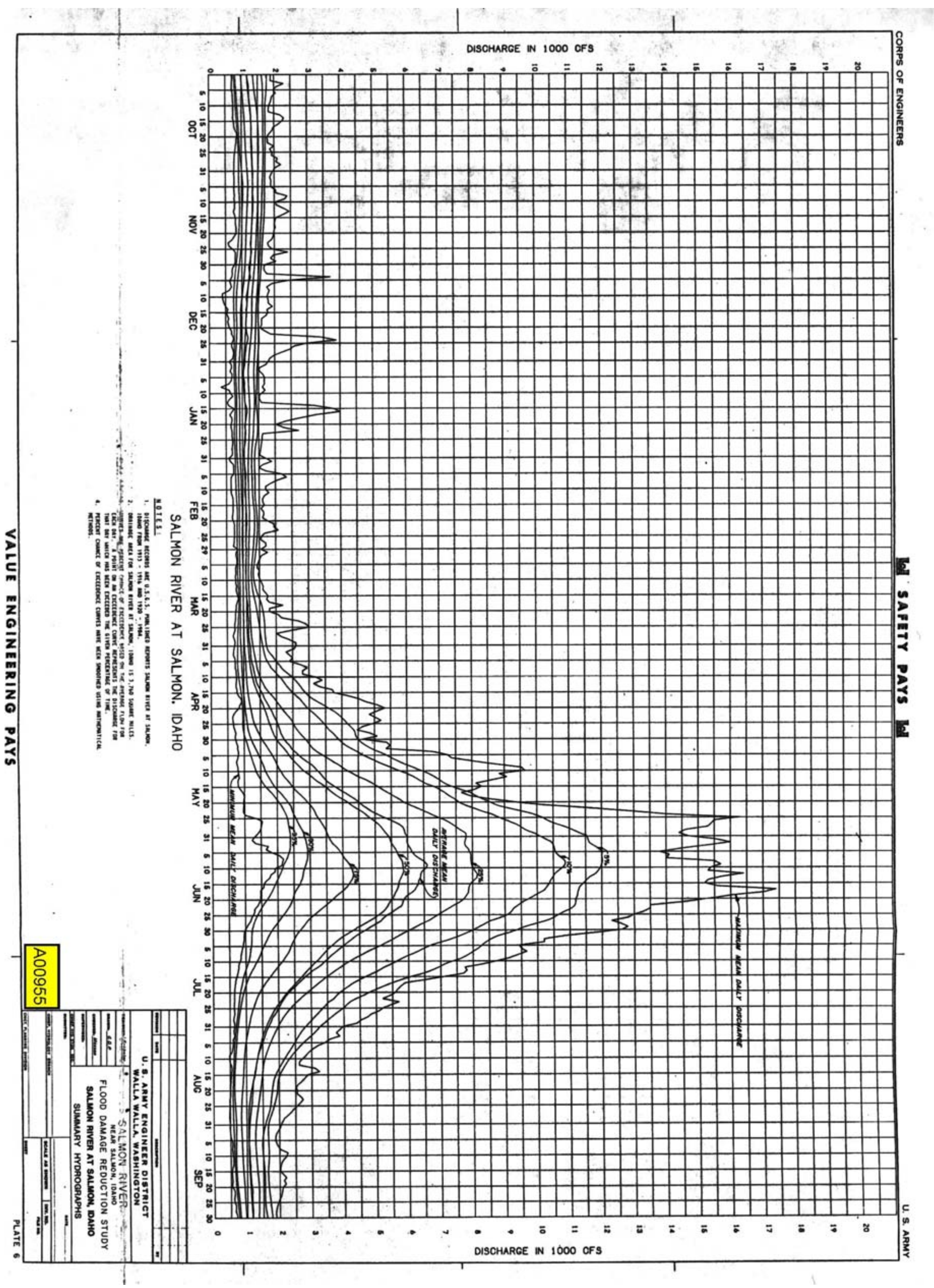
Thunderstorms occurring in late spring and summer may also vary precipitation patterns throughout the subbasin. In some instances, precipitation from the high intensity storms can cause flash flooding and subsequent erosion damage within a stream system (DEQ, 2003). A readily available summary hydrograph that is representative of the watershed is shown in figure 5-1.

The general slope aspect of the subbasin varies, which affects microclimates. The north facing slopes tend to be colder and wetter and retain snow longer. The south facing slopes are warmer and drier and have less vegetation (DEQ, 2003).

**5.1.4 Topography.** The topography of the Upper Salmon River Basin includes high elevation alpine peaks, steep mountains, rolling foothills, river valleys, and flood plains. The county contains portions of the Sawtooth, Salmon River, White Cloud, Pioneer, Lost River, and White Knob Mountains and contains the highest peaks in the state. The Sawtooth and Boulder Mountains, respectively, form the western and southern boundaries of the hydrologic unit. Peaks in these ranges stand over 10,000 ft (3048 m). The general relief of the area varies from nearly flat on the valley floors of the major drainages to nearly vertical cliffs on the mountain faces and cirque walls (BLM, 1998). The Salmon River, the major drainage of the subbasin, flows through narrow V-shaped valleys flanked by cliffs, rock outcroppings, and moderate- to very-steep terrain (DEQ, 2003). All the mountainous areas have been shaped by intense alpine glaciations. Glacial, fluvial, and alluvial deposits form the bottoms of the stream valleys (DEQ, 2003). U-shaped valleys formed by the glaciers characterize the midelevation mountains. Lands in the low elevation non-glaciated foothills have been shaped by faulting and folding and have been further modified by fluvial and colluvial processes (CCWG, 1998).

The Salmon River flows north through the Sawtooth Valley for approximately 25 mi (40.2 km) where the river then bends to the east at its confluence with Valley Creek near the town of Stanley. The Sawtooth Valley is an open, low-gradient, high-elevation valley with numerous wetlands (CCWG, 1998).

The Salmon River is confined in a canyon environment from the confluence with Valley Creek down to the 12-mile reach (King, 2002). Round Valley is a large open valley about 7 mi (11.3 km) long and 3 to 4 mi (4.8 to 6.4 km) wide. Figures 5-2 and 5-3 illustrate the slope and form of the Round Valley reach.




Information source is U.S. Army Corps Flood reduction study for Salmon, Idaho, developed from U.S. Geological Survey (USGS) published reports.

**Figure 5-1  Summary Hydrograph for the Upper Salmon River at Salmon, Idaho.**

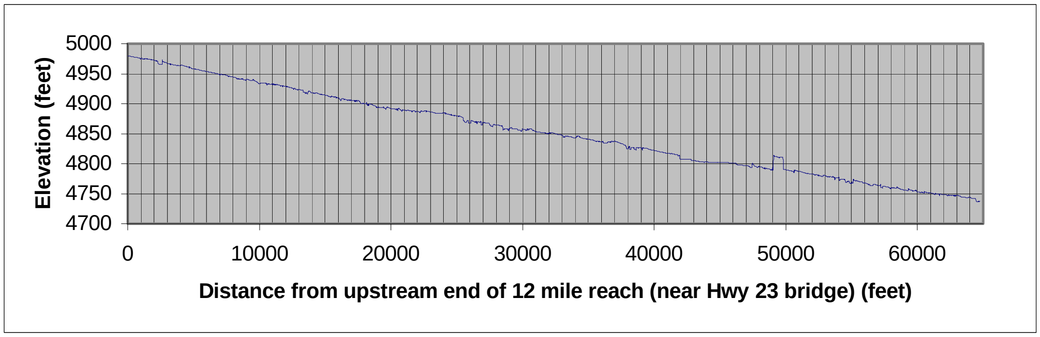



**Figure 5-2 Valley Slope of the 12-Mile Reach.**

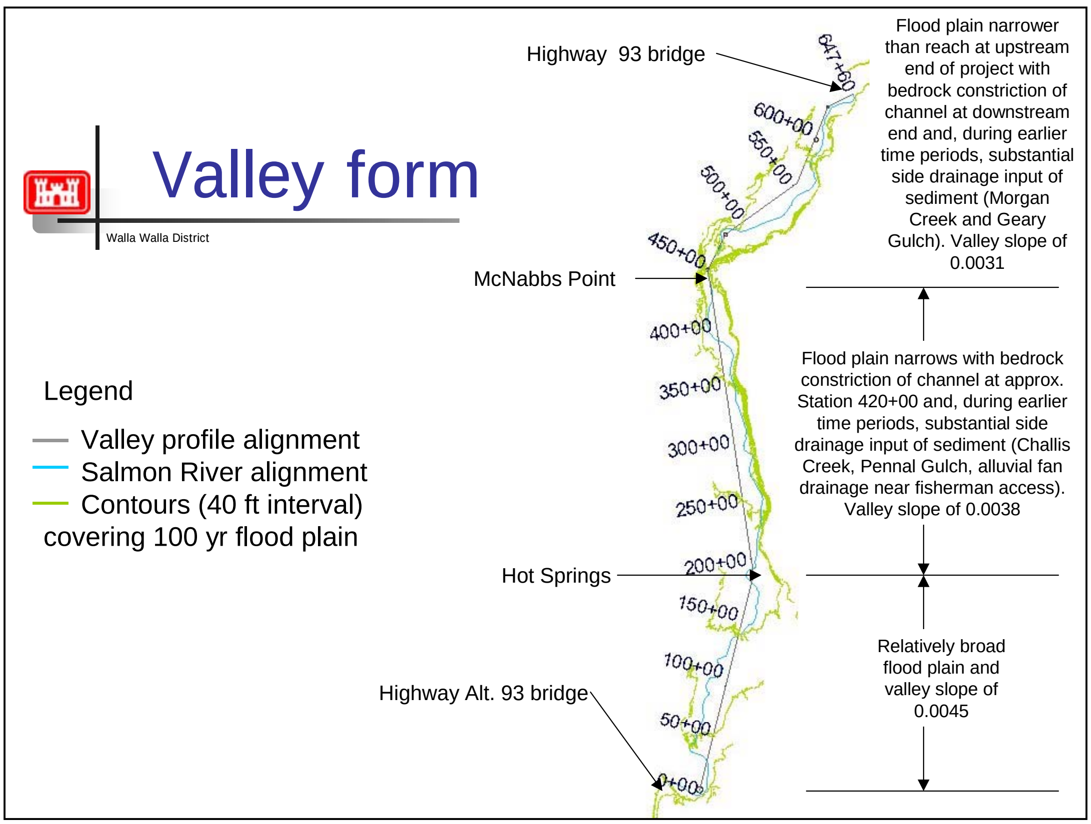



**Figure 5-3 Valley Form of the 12-Mile Reach.**

The river then flows east through a steep, narrow canyon for 35 mi (56.3 km) where the river bends to the north at its confluence with the East Fork Salmon River. The elevation of the river drops about 900 ft (274 m) over this 35-mi (56.3-km) stretch. From its confluence with the East Fork, the river flows across dissected foothills and terraces until it enters the Round Valley near Challis (CCWG, 1998).

**5.1.5 Geology.** The geology of the Upper Salmon River subbasin is variable. The area is underlain by a thick sequence of Paleozoic sedimentary rocks, called basement rocks, which are intruded on the west by the Eocene age Idaho batholiths and overlain to the east by tertiary Challis volcanic rocks (CCWG, 1998). The basement rock is the old continental crust that separates the northern and southern parts of Idaho. It is comprised of 1.5 billion year old gneiss and schist, metamorphosed from much older rock under intense heat and pressure. The highest elevations are found in the Boulder Mountain Range [*e.g.*, Galena Peak, 11,170 ft (3405 m)] (DEQ, 2003).

The thick sequence of Paleozoic rocks, underlying the area, appears in two north-south trending bands. One band through the center of the White Cloud Peaks area and another small band extends north and south of Clayton. These exposures of sedimentary rocks may be regarded as erosional remnants or islands perched on the massive intrusions of the granitic rocks and buried in places by the volcanic rocks (CCWG, 1998).

The Idaho batholith is composed of granite-like rock, primarily granodiorite, quartz diorite, and quartz monzonite. The volcanic rocks are designated the Challis volcanics and crop out widely in the east half of the area, usually, but not always at elevations considerably below the high peaks and ridges. The volcanic rocks are younger than the granitic rocks of the Idaho batholith, yet of sufficient age that considerable erosion and physical alteration has occurred (CCWG, 1998).

A few surficial deposits of Quaternary age are present in the area. Large glacial deposits occur in the Big and Little Boulder Creeks drainage basins. These deposits are primarily Pleistocene age, till and course gravel of glacial origin. The largest extent of alluvial deposits occurs in the Stanley Basin (CCWG, 1998).

**5.1.6 Soils.** Soils throughout much of the canyon are derived from Challis volcanics, quartz monzonite, sedimentary limestone, and quartzite (USFS and BLM, 1999). Extremely shallow seas laid down the quartzite during the late Precambrian and again in the Paleozoic time. From the standpoint of sediment production, the poorly cemented silt, sandy silt, and bentonite fractions of the lakebed sediments are probably the largest sediment source (USFS; BLM, 1999). An additional source of sediment is the residual deposits of highly weathered material precariously perched on steep canyon walls and elevated terraces that can be washed down in heavy thunderstorms (IDEQ, 2003). Soils near the river are generally non-cohesive sandy loams and gravelly sandy loams (King, 2002). Additional information on erosion and sediment transport is provided in appendix M.

An existing gravel pit is located southwest of the project site 4, near the sewage disposal ponds at T14N R19 E Section 22. The spoil area is shown on plate 15. Site 4 Pennal Gulch is the only site anticipated to generate excess material that would require relocation offsite to this spoil area. However, other project sites could use the spoil area, if needed. An onsite spoil area is identified for Site 1 Dunfee Slough on plate 13.

**5.1.7 Hydrology and Flood Plain Connectivity.** The rivers and streams in this region are very dependent on winter snowpack for spring and summer flows. Federally administered lands in the Upper Salmon River have a changed hydrology due to road construction, vegetation alteration (including silvicultural practices, fire exclusion, and forage production), and improper livestock grazing practices. Water quantity and flow rates have been locally affected by dams, diversions, and ground water withdrawal (State of Idaho, 1999). The 12-mile reach is in a Federal Emergency Management Agency (FEMA) detailed Flood Insurance Study (FIS)(FEMA, 1988). The flood plain analysis for the project determined that there would be no rise in the 100-Year Flood (1 percent chance exceedance) water surface elevations. See appendix F for additional details.

Major tributaries upstream of the 12-mile reach include East Fork Salmon River, Yankee Fork, Valley Creek, and the headwaters of the Salmon River (see figure 2-4) (King, 2002).

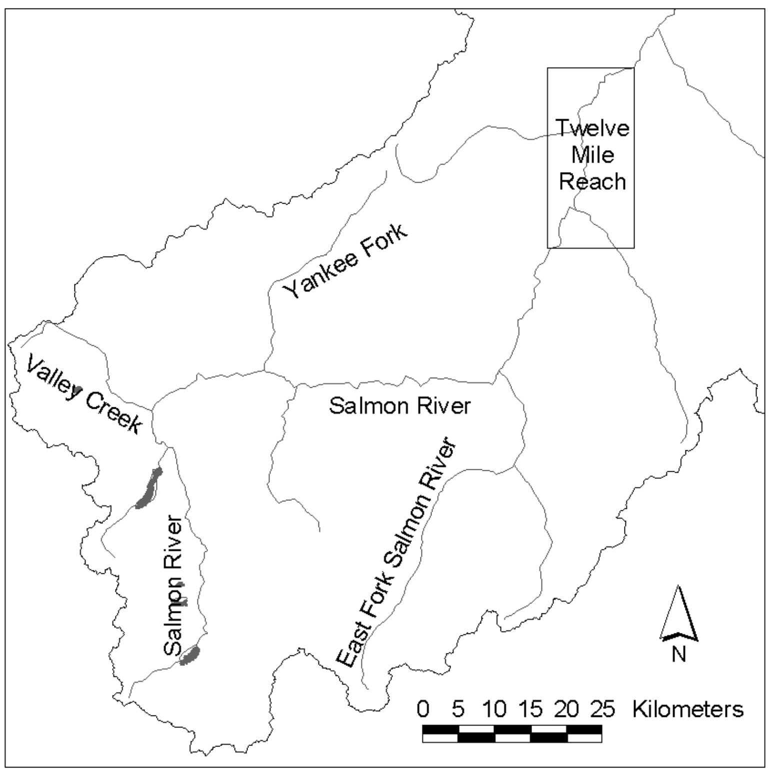



**Figure 5-4 Major Tributaries of the Upper Salmon River Watershed.**

The Upper Salmon River subbasin extends from the headwaters to the confluence with the Pahsimeroi River. The project is located at the lower (northern) end of the subbasin. The subbasin is further broken down into smaller areas called subwatersheds (see plate 7). The Upper Salmon River flows northward through the Round Valley area.

Significant tributaries within the 12-mile reach include Challis Creek, Garden Creek, Morgan Creek, Warm Springs Creek, and Pennal Gulch with minor discharges from about six smaller gulches (DEQ, 2003). The appendix G contains additional information about the subbasins listed in table 5-2 below. Flow contributions from these tributaries are likely moderately significant compared with the magnitude of flow in the main river. However, gauging records for these tributaries are sparse. At the USGS gauging station near Bayhorse Creek (station 13298500), 8 mi (12.9 km) upstream of the project reach, the drainage area is 1,810 $mi^2$ (4660 $km^2$). At the upper Highway 93 bridge, the drainage area is 1,840 $mi^2$ (4740 $km^2$) and at the downstream Bruno Bridge, the drainage area is 2,400 $mi^2$ (6160 $km^2$) (King, 2002).

**Table 5-2 List of Local Subwatersheds.**

| Subwatershed Name | Subbasin No. |
|---|---|
| Ellis Creek | 1706020101 |
| Bayhorse Creek | 1706020104 |
| Morgan Creek | 1706020131 |
| Challis Creek | 1706020130 |
| Mill Creek | 1706020129 |
| Garden Creek | 1706020128 |

Flow conditions at the upstream gauging station (Salmon River near Challis) range from a typical late summer low of 812 cfs (23 $m^3/s$) to bankfull discharge near 7,950 cfs (225 $m^3/s$). The peak discharge of record is 17,650 cfs (500 $m^3/s$), occurring June 17, 1974. Peak discharges generally occur in May and June, driven by snowmelt in the upper basin (King, 2002).

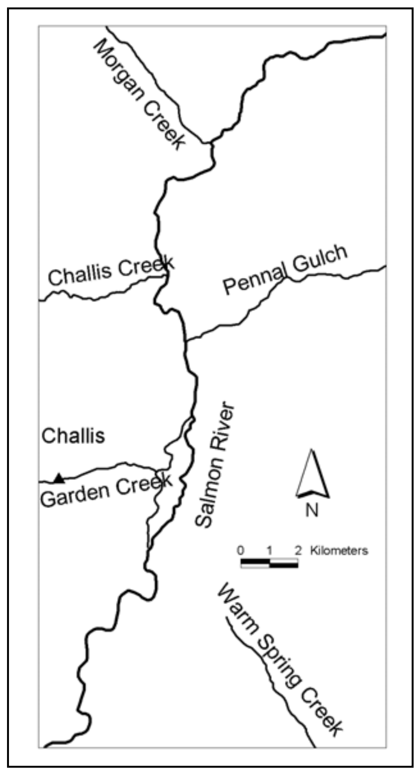



**Figure 5-5 Significant Tributaries within the 12-Mile Reach.**

The streamflow amounts can be estimated using the information from the USGS station 13298500, Salmon River near Challis. This station is located on the Salmon River below Bayhorse Creek and does not include the flow from Garden, Challis, or Morgan Creeks. The bankfull flow for the gauging station is 7,250 cfs (205.3 $m^3$/s), with a recurrence interval of two years. This is a good estimate for the entire reach with only a slight flow increase at the end of the assessment area. Instantaneous peak flow for the 10-year recurrence event (10 percent chance) is 12,200 cfs (345.5 $m^3$/s); 25-year event (4 percent chance) is 14,200 cfs (402 $m^3$/s); 50-year event (2 percent chance) is 15,600 cfs (441.7 $m^3$/s); and estimated 100-year event (1 percent chance) is 17,000 cfs (481.4 $m^3$/s) (CCWG, 1998). Table 5-3 provides summary gauge station data for the Salmon River at Salmon, Idaho.

**Table 5-3 Salmon River Gauge Station Data at Salmon, Idaho.**

| Drainage Area RM | Station No. (source) | Data years | Ave. Annual Flow (cfs/ $m^3$/s) | Minimum Flow (cfs/ $m^3$/s) | Maximum Flow (cfs/ $m^3$/s) |
|---|---|---|---|---|---|
| Salmon River at Salmon, ID | 13302500 (USGS) | 1913-1916 1919-2000 | 1,958/55.4 | 242/6.9 (1-8-37) | 17,500/495.5 (6-17-74) |

Modeled conditions indicate a bankfull discharge through the 12-mile reach varying between 5,600 and 11,900 cfs (159 and 337 $m^3$/s) at individual cross sections with an average value of 8150 cfs (231 $m^3$/s) for the lower bank. These findings are based on the modeled discharge required to reach bank level using fourteen representative cross sections (King, 2002).

In the 12-Mile reach, bankfull discharge appears capable of mobilizing 4-inch (10.6-cm) particles. In order for flow to break up the riverbed armor layer and expose the underlying bed material, discharge generally must mobilize the armor layer comprised of particles sized 3.25 inches (8.25 cm) in diameter. It appears unlikely that bankfull discharge fully mobilizes the armor layer through much of the 12-mile reach (King, 2002).

**5.1.8 Irrigation.** There are several locations where excess irrigation water enters the Salmon River within the project area. The return locations are not always fixed and may vary from season to season, depending on irrigation patterns, crops planted, and rainfall patterns. Typically, the water temperature is elevated due to air and land warming effects and carries higher levels of chemicals from fertilizers, such as nitrogen and phosphorus. The volume of return water also varies greatly from season to season and fluctuates greatly during the season, depending on the efficiency of upstream irrigators, the amount of water provided, and the need for water.

## 5.2 Environmental Resources

The proposed project area contains environmental resources that are divided into the following seven categories: aquatic resources, vegetation, wildlife, threatened and endangered species, water quality, wetlands, and air quality.  These environmental resources are described and discussed separately in the sections that follow.

**5.2.1 Aquatic Resources.** While fish are the primary aquatic species of interest, other aquatic residents include:  amphibians and insects.  Common aquatic insects include mayflies, caddisflies, dragonflies, and stoneflies.

Clear, cool mountain streams characterize the Upper Salmon River subbasin.  Most streams historically contained a number of native salmonids, including bull trout, westslope cutthroat trout, resident rainbow trout, mountain whitefish, salmon, and steelhead trout.  The subbasin contains spawning and rearing waters for anadromous fish.  This includes steelhead trout, chinook salmon, and sockeye salmon, and represents the second longest migration route in North America (State of Idaho, 1999). In fact, the subbasin contains the sole remaining population of anadromous sockeye within the Snake River Basin (State of Idaho, 1999).

The subbasin supports some of the most important spawning and rearing habitats for the Snake River spring/summer chinook salmon, although current stocks are severely depressed compared to historic levels (State of Idaho, 1999).  Chinook spawn in all sizes of rivers and streams in the subbasin; thus, most streams were designated critical habitat (State of Idaho, 1999).  Adult chinook arrive in May and June and spawn from August to October.

The central Idaho mountain streams and rivers are core areas for remaining bull trout populations.  Their distribution is patchy even when population numbers are strong and habitat is good (State of Idaho, 1999).  Bull trout generally spawn in mid- to late September through October in the Salmon River Basin (DEQ, 1999).  In the Sawtooth National Recreation Area (SNRA), they spawn in early September, or in some cases, early to mid-August at the highest elevations.  Anglers have reported catching larger and more bull trout in the Salmon River canyon and in Redfish and Alturas Lakes recently (DEQ, 1999).  Threats to bull trout in this subbasin include channelization, diking, riprap, and resultant loss of streamside vegetation and flood plain in low elevation reaches, and stream corridor roads, historic mining, and timber harvesting and their effects on sedimentation and water temperatures.

The same threats are true for westslope cutthroat trout, although populations may be a little more widespread, especially in wilderness/roadless areas.  Cutthroat trout are now primarily found in small headwater streams (DEQ, 1999).  The larger migratory form of cutthroat is essentially extinct from the subbasin (DEQ, 1999).  The last large cutthroat trout were seen in the 1920s and 1930s in the Stanley area.  The last migratory population in Valley Creek disappeared in the 1940s.  The East Fork Salmon River had a few migrating cutthroats until the 1980s.  Hatchery cutthroat trout are being stocked into mountain lakes in the subbasin, and an intensive reintroduction of cutthroats and bull trout is taking place in Valley Creek (DEQ, 1999).

The Salmon River in general is considered a core area for remaining stocks of wild steelhead trout. Rainbow trout are the most widely distributed native salmonid (DEQ, 1999). Many surveys tend not to separate young steelhead from resident rainbows, although it is likely that most rainbow trout surveyed are likely residents, isolated by irrigation diversion structures.

Many of these salmonids have experienced declines in habitat and abundance during the last century (State of Idaho, 1999). Declines in the anadromous species have been the greatest. Within the subbasin, problems include habitat degradation and streamflow alteration and irrigation diversion in the lower watersheds, and the introductions of non-native salmonids, especially brook trout.

Introductions of non-native fish into the subbasin include sunapee char, arctic grayling, golden trout, lake trout introduced into high mountain lakes, and brook trout and non-native rainbow trout introduced into streams and lakes (State of Idaho, 1999). Brook trout are widely distributed and occur in most tributaries above Clayton (DEQ, 1999). In this subbasin, brook trout prefer small tributaries and are not found in the main stem Salmon River. Brook trout tend to dominate the lower elevation reaches and native trout stay in higher elevation reaches. In 1995, Valley Creek surveys were 100 percent brook trout. Also, some mountain lake systems (lakes and inlet/outlet streams) are completely dominated by brook trout.

Recent sampling associated with DEQ's large river Beneficial Use Reconnaissance Project (BURP) monitoring resulted in multiple age classes of salmonids, as well as several sculpin and dace species, large-scale sucker, chiselmouth, northern pike minnow, and redside shiner (table 5-4).

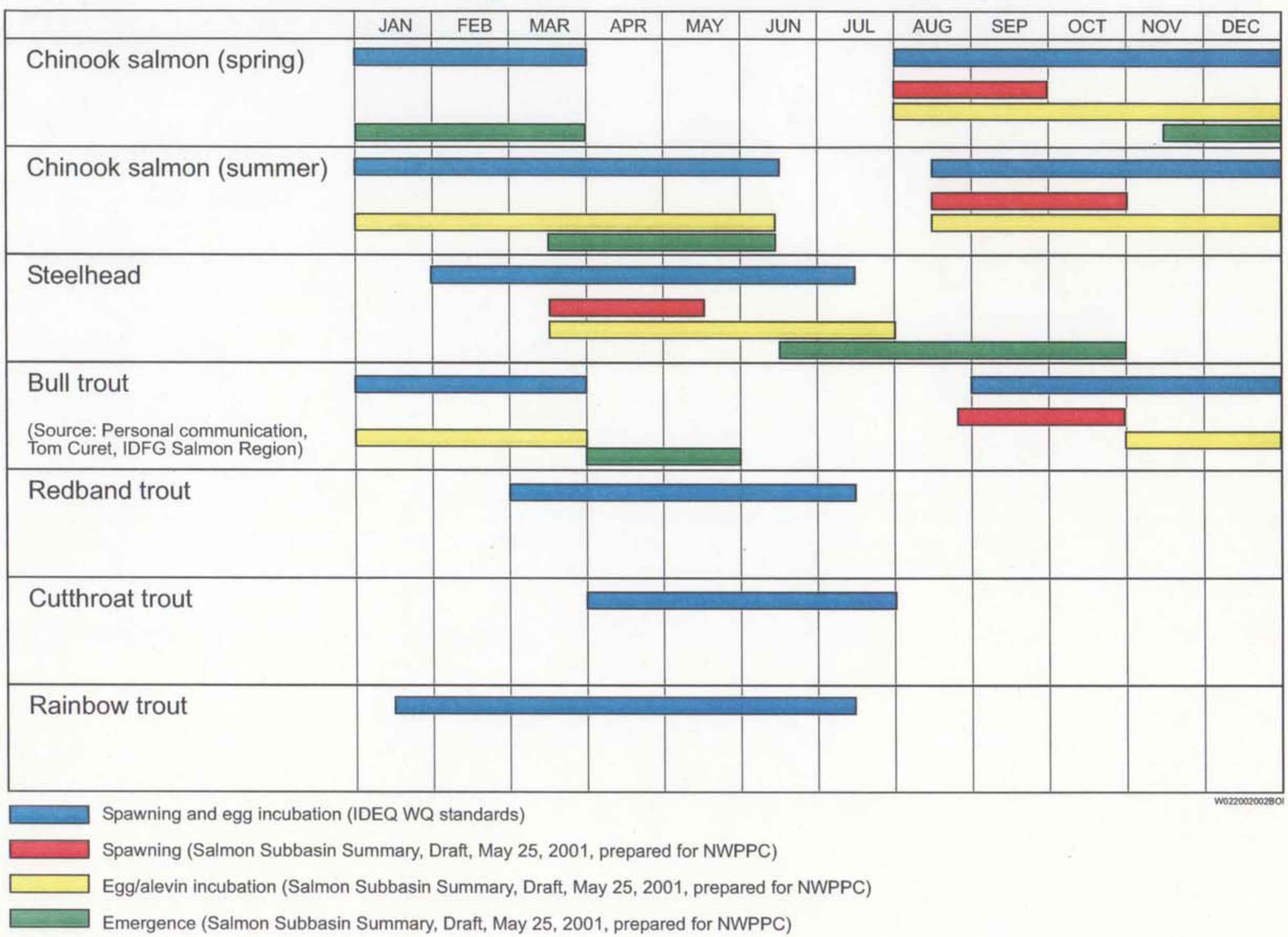
**Table 5-4 Large River BURP Fish Collections in 1999.**

| Location | Fish Collected | Age Classes |
|---|---|---|
| Salmon River at Yankee Fork near Clayton | 8 chinook, 40 mountain whitefish, 3 rainbow trout, 5 mottled sculpins, 65 shorthead sculpin, 3 longnose dace | Trout ages = 5<br>Salmonid ages = 6<br>Sculpin ages = 5 |
| Salmon River at Pahsimeroi River near Challis | 16 chinook, 73 mountain whitefish, 6 rainbow trout, 53 mottled sculpin, 5 shorthead sculpin, 55 large-scale sucker, 1 chiselmouth, 2 longnose dace, 1 northern pike minnow, 8 redside shiner, 8 speckled dace | Trout ages = 3<br>Salmonid ages = 6<br>Sculpin ages = 4 |
| Salmon River near Obsidian (passes 1 and 2 combined) | 19 brook trout,<br>10 cutthroat trout,<br>18 shorthead sculpin | Trout ages = 4<br>Salmonid ages = 4<br>Sculpin ages = 4 |

Other native fish include the Pacific lamprey, once abundant where anadromous host fish resided. The presence of white sturgeon in the Salmon River is documented as recent as 1996 by Salmon-Challis National Forest (DEQ, 2003).

Figure 5-6 identifies critical life stages, such as spawning and egg incubation to egg emergence, for various fish species. The chart illustrates that every month has several species in a critical life stage and in-water work always has the potential to affect one or more species.

**Figure 5-6 - Critical Life Stage Time Periods for Various Fish Species.**



**5.2.2 Vegetation.** The Upper Salmon River hydrologic unit is characterized by rocky, sparsely vegetated alpine peaks; timbered mountain slopes; sagebrush foothills; and meadows, wetlands, and riparian areas. The dominant tree species include Douglas fir, subalpine fir, lodgepole pine, whitebark pine, and Engelmann spruce. The non-forested vegetation consist primarily of dry grasses (bluebunch wheat grass), dry shrubs (Wyoming big sagebrush), and cool shrubs (mountain big sagebrush). Historic riparian shrubs and woodland vegetation have been reduced in extent by riparian herbaceous vegetation by grazing and land disturbance, allowing invasion by exotic species and noxious weeds (State of Idaho, 1999). The non-forest vegetation can be divided into two shrub/grass types: (1) A dry shrub/bunchgrass type dominated by Wyoming big sagebrush and bluebunch wheatgrass, and (2) a low shrub type dominated by low sagebrush and black sagebrush. Other species of importance include bitterbrush, curl-leaved mountain mahogany, arrowleaf balsamroot, and Idaho fescue (BLM, 1998). Areas inundated with water are dominated by cattails. Native grasses are tufted hairgrass and alkali sacaton [Idaho Soil Conservation Commission (ISCC), 1995].

Strongly glaciated lands over 10,000 ft (3048 m) are generally rocky, open and sparsely vegetated. Mountain big sagebrush, Basin big sagebrush, Wyoming sagebrush, and low sagebrush are the principal sagebrush species identified in the area. Sagebrush often grows on south-facing slopes and interspersed in timbered areas. Sedges, grasses, and numerous forb species are found in meadows and wetland areas. Several types of riparian communities are common in the subwatershed area. Included are riparian areas timbered with coniferous trees, such as spruce, lodgepole pine, and subalpine fir; cottonwood riparian areas; and riparian areas dominated by deciduous woody shrubs, such as willows, dogwood, and alder. Cottonwood is the dominant tree on the flood plain. Because it is not regenerating, there is very little diversity of age classes. Re-establishing cottonwood would help stabilize the banks and flood plains (CCWG 1998).

Historically, riparian vegetation and woodlands included aspens, alders, willows, and abundant herbaceous vegetation (*e.g.*, sedges). However, their extent is much reduced and is now mostly dominated by exotic species and noxious weeds (State of Idaho, 1999).

The Upper Salmon River's forested vegetation encompasses a range from high elevation whitebark pine to a subalpine/lodgepole pine. The North Fork Basin is extensively forested due to its mountainous terrain that is steep and dissected. As a result, it creates varied microclimates and consequent plant communities. Mature ponderosa pine stands typically have an understory dominated by Douglas fir. The higher elevations, much like the Upper Salmon River region consist of mature even-aged lodgepole and whitebark pine stands, which are gradually being replaced with subalpine fir.

The value of a healthy viable riparian zone cannot be overstated. Riparian vegetation not only stabilizes banks and directly contributes to stream biological productivity and fish and wildlife habitat quality but also provides a buffer, which very effectively reduces the impacts of land use practices on the aquatic ecosystem.

Riverine and terrestrial ecosystems are linked, being only separated by a riparian zone. Riparian areas serve as a buffer and effectively moderate the negative effects of the land use practices. Riparian vegetation provides logs and branches that shape channel morphology, retain organic matter, and provide habitat for a variety of species. Trees growing along streams are important and often essential to maintaining stream stability (Platts, 1991). Riparian vegetation root systems stabilize streambanks and maintain undercut banks. Brush, like trees, contributes to stability in vegetation mats and sod banks that reduce surface erosion. Streamside vegetation needs to be vigorous, dense, and have enough species diversity that it can form layers over the ground. Dense, diverse, and vigorous riparian vegetation and soil conditions that allow water infiltration are needed for flood plains to function properly. Soil conditions that allow moisture infiltration permit flood plain inundation without bank erosion (CCWG 1998).

**5.2.3 Wildlife.** Riparian habitat provides a traveling, resting, and foraging corridor for various wildlife. Mammals, birds, and other wildlife may inhabit riparian corridors for part of the year, or year round. A list of proposed and candidate species that may be found in Custer County, Idaho, is provided in appendix H. The USFWS advises an evaluation of potential effects for species that could be listed during the project planning period.

Wildlife expected to occur near the proposed project area are birds, amphibians, reptiles, and mammals. Birds include various waterfowl, songbirds, migratory birds, wading birds, and raptors. Ruffed grouse, turkey, kingfisher, quail, mountain grouse, swallows, sparrows, woodpeckers, ducks, hawks, and owls are most common. Amphibians that may be found in the area are tree frogs, leopard frogs, and bull frogs. Reptiles include the northern sagebrush lizard, western rattlesnake, and bull snake. Mammals common to the area include elk, white-tailed deer, coyote, raccoon, mink, mule deer, muskrat, beaver, otter, skunk, bats, various small rodents, and occasionally bobcat, black bear, and cougar. Beaver are a component of this system and reside in the banks of the Salmon River and side channels (CCWG, 1998).

**5.2.4 Threatened and Endangered Species.** The following threatened and endangered species list was obtained from the USFW letter dated February 27, 2003 (1-4-03-SP-298), which forwarded the Bi-annual County by County Species list for the State of Idaho. For species of concern and additional details, see appendix H.

**<u>Federal Threatened and Endangered Species Listing for the project area:</u>**

**ENDANGERED** - Sockeye salmon (*Oncorhynchus nerka)*

**THREATENED** - Bald eagle (*Haliaeetus leucocephalus)*
Spring/Summer chinook salmon (*Oncorhynchus tshawytscha*)
Steelhead (Middle Columbia River) (*Oncorhynchus mykiss)*
Bull Trout (*Salvelinus confluentus*)
Canada Lynx (*Lynx canadensis*)

**EXPERIMENTAL/NONESSENTIAL POPULATION**
Gray Wolf (*Canis lupus*)

**PROPOSED SPECIES**
None

**CANDIDATE SPECIES**
Yellow-billed cuckoo (*Coccyzus americanus)*

The following information provides additional information about the threatened and endangered species and their relevance with respect to the proposed project.

### 1. Bald eagles

The USFWS listed bald eagles as endangered under the ESA on February 14, 1978. On July 12, 1995, this species was reclassified to threatened status in the lower 48 states. It was proposed for de-listing on July 6, 1999. The species' status will be re-evaluated at the end of the 5-year monitoring period. The USFWS is currently preparing a de-listing monitoring plan. Bald eagles are also protected under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act. Measures to minimize disturbance at nesting sites should be taken to ensure future management for this species.

Bald eagles are large raptors that are primarily associated with riparian habitat. The bald eagle is a bird of aquatic ecosystems. It frequents estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. However, such areas must have an adequate food base, perching areas, and nesting sites to support bald eagles. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and that offer good perch trees and night roosts. Bald eagle habitats encompass both public and private lands.

Bald eagles primarily eat fish but will scavenge for any readily available food source including carrion. The most common food sources for bald eagle in the Intermountain Region are fish, waterfowl, jackrabbits, and various types of carrion (USFWS, 1986).

Critical habitat is not currently mapped or proposed for bald eagle in the Upper Salmon River at Challis (USRC) area along the Salmon River. Bald eagle habitat (nesting or wintering) occurs throughout Idaho, including the Salmon River. The BLM conducts annual surveys and monitors bald eagle use of the Salmon River in the USRC Area. They have not established any bald eagle management areas within this project area. There are no bald eagles currently nesting in this area, and there are no historic records of nests. The BLM has records of nesting osprey in this area, which indicates suitable nest sites are available for bald eagles.

The BLM estimates a winter population of bald eagles in the Challis area of approximately 30 birds. It is believed that a dead animal pit north of Challis, used by the county highway department to dispose of road-killed animals, is one of the primary attractions for these birds. Two winter habitat characteristics appear to play a significant role in habitat selection in the cold months: diurnal perches and communal night roost areas. Habitat requirements for communal night roosting are different from those for diurnal perching. Communal roosts are invariably near a rich food resource and have at least a remnant of old-growth forest components. Most communal winter roosts used by bald eagles offer considerably more protection from the weather than diurnal habitat. Perches are normally located in close proximity to a food source. Most tree perches selected by eagles provide a good view of the surrounding area, often utilizing the highest perch sites available (USFWS, 1986). Diurnal perches are used during foraging; these usually have a good view of the surrounding area and are often the highest perch sites available (Stalmaster, 1976). The riparian habitat along the Salmon River in the USRC Area offers very little protection from the weather. There are no specific bald eagle nesting or roost sites identified in the project area.

### 2. Bull Trout

The USFWS listed bull trout in the Columbia River Distinct Population Segment as a threatened species under the ESA on July 10, 1998 (63 FR 31647). Bull trout occupy a variety of stream habitats that are increasingly fragmented by human-related disturbances, including introductions of non-native fishes, habitat degradation, migration barriers, and altered disturbance regimes.

The central Idaho mountains are core areas for remaining bull trout populations. Their distribution is patchy even when population numbers are strong and habitat is good (DEQ, 2001). Resident, fluvial (larger rivers), and adfluvial (lakes) are the three life history forms that bull trout populations may exhibit in Idaho. Resident forms generally spend their entire lifecycle in small headwater streams such as Challis Creek, while fluvial fish spend a portion of their lives in the main stem and migrate to headwater streams to spawn. Adfluvial populations spawn in headwater streams and migrate to lakes or reservoirs for winter. Seasonal movements may range up to 185 mi (300 km) as migratory fish move from spawning and rearing areas into overwinter habitat in downstream reaches of large basins. Both forms are believed to exist together in some areas, but migratory fish may dominate populations where corridors and subadult rearing areas are in good condition (Rieman and McIntyre, 1993). Bull trout in the Salmon River use resident, migratory, and fluvial life history strategies.

Challis Creek, a tributary in the USRC reach of the Salmon River, has a population of bull trout. The fish are present, but there is no other information. A fluvial population has likely been eliminated due to irrigation practices and a migratory population is unlikely. Brook trout are present and hybridization is occurring in Challis Creek (State of Idaho, 1999).

Morgan Creek, another tributary in the 12-mile reach, flows into the Salmon River about 10 mi (16 km) north of the town of Challis. Morgan Creek does not have bull trout in it but one of the tributaries, West Fork Morgan Creek, does have bull trout. It is not clear why bull trout are not present in Morgan Creek. The habitat is good and brook trout are present. There is limited potential for a fluvial bull trout population, because brook trout inhabit the subwatershed. Morgan Creek is seasonally disconnected from the Salmon River with diversions that alter flow regimes. (State of Idaho, 1999).

Bayhorse Creek is located about 10 mi (15 km) south of the town of Challis. It does not flow into the Salmon River within the 12-mile reach but bull trout that reside in Bayhorse Creek could use the 12-mile reach project during the winter. The condition of Bayhorse Creek is generally very good to excellent with regard to aquatic habitat. Bull trout are known to inhabit the stream but population size and condition is unknown (State of Idaho, 1999).

Preferred spawning habitat typically consists of low gradient stream reaches with loose, clean gravel, but spawning has been documented in steeper reaches where substrate is suitable and other habitat features are present. Spawning bull trout move into natal tributaries beginning in August and spawn in mid- to late September and October (Tom Curet, IDFG, personal communication.) Bull trout seek areas with cold-water temperatures for spawning. Spawning substrate consists mostly of loosely compacted gravel and cobble. Preferred spawning sites normally include runs and tail-out areas of pools with water depth of 0.7 to 2.6 ft (0.21 to 0.79 m). Substrate size and level of embeddedness are important factors influencing egg survival to emergence. When fines exceed 30 percent, egg fry survival decreases dramatically (State of Idaho, 1999).

Eggs hatch in winter or early spring after 100 to 145 days incubation. Fry remain in the gravel for another 65 to 90 days until yolk sac absorption is complete; parr marks develop and actual feeding begins while fry are still in the gravel. Fry emerge from gravel in early spring, usually April (State of Idaho, 1999).

Juvenile bull trout live near the stream bottom for the first 2 years of life using slow water within swift stream reaches. Unembedded cobble, boulders, and dispersed woody debris are common forms of cover (State of Idaho, 1999).

In streams, all bull trout life stages are associated with various forms of cover, including large woody debris, undercut streambanks, boulders, and pools. Cover provides important rearing, foraging and resting habitat, and protection from predators (State of Idaho, 1999).

Water temperature is an important and inflexible habitat requirement for bull trout, and its influence on bull trout distribution has not been completely defined. Even though bull trout may move throughout whole river basins seasonally, spawning and juvenile rearing appear to be limited to the coldest streams or stream reaches. Temperatures above 15 $^{o}$C (59 $^{o}$F) may limit distribution. While optimum temperatures for rearing bull trout are from 6.6 to 8.3 $^{o}$C (44° to 47 $^{o}$F), bull trout rearing habitat during summer months was linked to elevation, with higher elevations correlating to cooler stream temperatures. Bull trout spawn when water temperatures are near 7.7 $^{o}$C (46 $^{o}$F). Survival of bull trout eggs varies with water temperature.

Most bull trout mature between 5 and 7 years of age, while other resident fish appear to mature at age 3 or 4. Bull trout probably spend 1 or 2 years in headwater streams before moving into the main stem of the Salmon River. Juvenile bull trout may migrate during the summer or fall of their second or third growing season (State of Idaho, 1999).

Four key factors have affected and are affecting bull trout. They are:

1. Over-harvest due to angling.

2. Watershed disruption - Changes in or disruptions of watershed processes are likely to influence characteristics of stream channels and are likely to influence the dynamics and persistence of bull trout populations. Bull trout have been more strongly associated with pristine or only lightly disturbed habitat. Channelization, dikes, riprap, and resultant loss of stream side vegetation and flood plain in low elevation reaches have all affected bull trout. In addition, stream corridor roads, historic mining, and timber harvesting have affected sedimentation and water temperatures (IDEQ, 2001).

   Patterns of streamflow and the frequency of extreme flow events that influence river substrate are important factors in population dynamics. With overwinter incubation and a close tie to the substrate, embryos and juveniles may be particularly vulnerable to flooding and channel scour associated with the rain-on-snow events common in some parts of geography of northern Idaho and northwestern Montana. Channel dewatering, as a result of low flows and bed aggradations, has also blocked access for spawning fish resulting in year class failures (Rieman and McIntyre, 1993).

3. Introduction of non-native species - Some introduced species such as kokanee may benefit bull trout by providing forage. Others such as brown, brook, and lake trout may have depressed or replaced bull trout populations. Brook trout are an important problem and may progressively displace bull trout through hybridization and higher reproductive potential. Introduced species may pose greater risks to native species where habitat disturbance has occurred (Rieman and McIntyre, 1993).

4. Isolation and fragmentation of the population – Historically, bull trout populations were well connected throughout the Columbia Basin. Habitat available to bull trout has since been fragmented, and in many cases, populations have been isolated entirely. Irrigation diversions, culverts, and degraded main stem habitats have eliminated or seriously depressed migratory life histories effectively isolating resident populations in headwater tributaries. Introduced species such as brook trout may displace bull trout in lower stream reaches further reducing the habitat available in many remaining headwater areas. Loss of suitable habitat through watershed disturbance may also increase the distance between good or refuge habitats and strong populations thus reducing the likelihood of effective dispersal (Rieman and McIntyre, 1993).

Recent sampling (1999), associated with DEQ large river BURP project, collected fish in the main stem Salmon River near the town of Clayton and at the mouth of the Pahsimeroi River, near Challis. They found rainbow trout and chinook salmon but no bull trout (DEQ, 2001).

### 3. Canada Lynx

The USFWS listed Canada lynx as threatened on March 24, 2000 [Federal Register (FR) Volume 65, No. 58]. Lynx are medium-sized cats, distinguished by a short body, long legs, large padded feet, and ears tipped with a tuft of long hair. They are specialized predators that are highly dependent on snowshoe hares for food.

The distribution and abundance of the snowshoe hare affect the lynx's geographic distribution, habitat selection, foraging behavior, reproductive capacity, and population density. Hares seek dense conifer thickets to feed on woody seedlings and saplings and to escape predators and extreme cold; lynx frequent these habitats in search of prey. Lynx also prey on grouse, flying squirrel, ground squirrel, beaver, mice, voles, fish, ungulates as carrion and occasionally prey, and red squirrels (Ruediger, *et al.*, 2000).

Their long legs and large feet make lynx highly adapted for hunting in the soft deep snow where snowshoe hares spend the winter. Lynx inhabit primarily the boreal, sub-boreal, and western mountain forests of North America (Ruediger, *et al.*, 2000). Its range extends south into the northern portions of the western mountains in the contiguous U.S., where environmental conditions at high elevations support boreal forest habitats similar to those found in northern regions of Canada and Alaska. Lynx are generally found in coniferous forest habitats above 4,500 ft (1372 m) in elevation. They typically occur where low topographical relief creates continuous forest communities of varying stand ages. Lynx habitat primarily consists of two structurally different forest types: early successional forests where prey availability, especially snowshoe hare, is usually high, and late-successional forests that provide cover for denning and kittens (USFS and BLM, 1999). Intermediate successional stages may serve as travel cover for lynx and help provide connectivity within a forested landscape. These travel areas fill in the gaps between foraging and denning habitats within a landscape. Early successional forests, where snowshoe hares are abundant, are favored by lynx for hunting.  These areas result from fires, timber harvest, wind throw, and disease.  Lynx habitats in the Rocky Mountains of the western United States are islands of coniferous forest surrounded by shrub-steppe habitats, but the nature of lynx movements between these habitats is poorly understood.  Lynx have been documented using shrub-steppe habitats that were near snowshoe hare habitats (within approximately 25 mi [40 km]) during jackrabbit population highs and when seasonally preying on Wyoming ground squirrels.  Although cover is important to lynx when searching for food, lynx often hunt along edges.  Lynx have been observed (via snow tracking) to avoid large openings, either natural or created, during daily movements within their home range (Ruediger, *et al.*, 2000).

There are no lynx reports (sightings, trapping reports, or other documentation) specific to BLM public lands within the Challis Resource Area (RA), which includes the project area.  Lynx are known to occur on the Salmon-Challis National Forest (BLM, 1998). Historic records indicate that lynx were fairly well distributed in the mountainous regions north and east of the Snake River in Idaho (Ruediger, *et al.*, 1994).

The public lands in the Challis RA of the BLM, including Round Valley, are located within the range of Canada lynx in Idaho.  To date, no specific inventories or studies of Canada lynx habitat have been conducted within the Challis RA.  Lynx would not be expected at the project sites, due to the close proximity of human activity and the lack of an abundant food source.

The broad, open sagebrush-steppe habitats that occur throughout most of the Challis RA probably pose significant barriers to lynx movements.  Roloff (1995) suggests that the wide sagebrush-steppe valleys that lie on both sides of the Lemhi and Lost River Mountain ranges (much of which is public land within the boundaries of the Challis RA) effectively isolate any lynx populations that may be present in these mountain ranges (BLM, 1998).

### 4. Gray Wolf

The USFWS first listed gray wolf as “Endangered” on March 11, 1967 (32 FR, 4001). Although listed elsewhere as endangered, wolves in central Idaho are classified as “experimental, non-essential” (FR, page 60266, Volume 59, No. 224, November 22, 1994).  In January 1995, gray wolves from Canada were reintroduced to the Frank Church River-of-No-Return Wilderness Area within 60-air mi (25.5-air km) of the Challis BLM RA [about 75 to 80 mi (32 to 34 km) from Round Valley] in an attempt to establish an experimental population.  Additional wolves were released in 1996.  Individual wolves wander in and out of the relocation area and are known to use public lands in the BLM Challis RA on an occasional basis.  According to recent surveys by the USFWS, there are about 141 wolves in central Idaho (USFWS, 2002).

Wolves use a wide range of habitats from grasslands to coniferous forests to alpine regions.  Habitat characteristics that wolves are usually associated with in the mountains of Idaho and western Montana are boreal and coniferous forests at higher elevations, as well as open brushy areas. Wolves travel large distances in search of prey often using home ranges greater than 100 $mi^2$ (259 $km^2$). They feed primarily on ungulates with small mammals as alternate prey. Wolf habitat is often evaluated based on the abundance of prey species, degree of conflict with humans, and suitable and secluded den and rendezvous sites (BPA, 1999).

Wolves breed in late January through April and pups are born after a 63-day gestation period (late March through May). Mesic meadows, with dense vegetation and forested borders, are favorite denning and rendezvous sites. Ungulate calving/fawning areas are particularly popular. Beaver-occupied riparian areas, situated far from human activities, may be important summer hunting grounds. Wolves are highly sensitive to human activity near denning sites (BPA, 1999). The USFWS monitored individual wolves and wolf packs in the central Idaho Wolf Recovery Area in 2001. Packs were located in Moyer Basin, Jureano Mountain, Twin Peaks, Whitehawk Mountain, and Wildhorse, all within 60-air mi (95.6 air km) of Challis, Idaho (USFS, 2001). The Nez Perce Tribe Gray Wolf Recovery Team has been able to document current and past wolf activity in the forested public lands surrounding Round Valley. There have been several lone wolves moving through the Challis area in the recent past. During the winter, there have been wolves moving through the foothills along the western breaks of the Salmon River from the town of Challis, south to the town of Stanley. In addition, to the south and east of Challis, wolf activity has been documented on both sides of Willow Summit along Highway I-93. The recovery team has received numerous reports in the Darling Creek and Challis Creek areas, just outside the town in the sagebrush foothills. They have not been able to confirm these reports to date, although it is feasible that wolves occasionally move through this country (personal communication, Curt Mack, 2002).

Past efforts to document gray wolves on BLM and USFS lands in the Challis area have primarily consisted of USFS or BLM biologists' follow-up investigations of reported wolf sightings or wolf sign. Reports of wolves that turn out to be domestic dogs or coyotes are common. Numerous probable sightings of gray wolves have been documented on National Forest lands above the Challis RA and Round Valley. Before the release of wolves in the Frank Church River-of-No-Return Wilderness Area in early 1995, recorded sightings were infrequent and widely scattered, based on review of Idaho Natural Heritage database records. No formal inventories or habitat surveys specific to wolves have been conducted by the BLM on their lands in and around Round Valley (BLM, 1998). No known documented wolf packs use the Round Valley as their home range.

### 5. Yellow-Billed Cuckoo

The USFWS accorded candidate status to the yellow-billed cuckoo on July 25, 2001, in the Federal Register (143 FR 38611-38626). They determined that the western yellow-billed cuckoo distinct population segment was warranted for listing but was precluded by other higher priority listing actions. The yellow-billed cuckoo currently holds no legal status under the ESA. The USFWS is concerned about their population status and suggest that this species and their habitat be considered during project planning and review.

The yellow-billed cuckoo is a secretive, robin-sized bird that in the western United States breeds in willow and cottonwood forests along rivers and streams. The bird's most notable features are a long, boldly patterned black-and-white tail and an elongated, down-curved bill, which is yellow on the bottom. Its plumage is grayish-brown above and white below. Adults have narrow, yellow eye rings. The bird primarily eats large insects including caterpillars and cicadas, as well as the occasional small frog or lizard. Yellow-billed cuckoos are migratory. Yellow-billed cuckoos usually lay two or three eggs, with development of their young occurring very rapidly. It takes 17 days on average from egg laying to fledging of young (USFWS, 2001). Although many species of cuckoos are brood parasites (laying their eggs in other birds' nests), the yellow-billed cuckoo usually builds its own nest and raises its own young [Oregon Department of Fish and Wildlife (ODFW, 2002)].

The yellow-billed cuckoo historically bred throughout much of North America. West of the Continental Divide, the species historically occurred from southern British Columbia, Canada, to northwestern Mexico. In recent years, the species' distribution in the west has shrunk considerably. (USFWS 2001). While the cuckoo is still relatively common east of the crest of the Rocky Mountains, biologists estimate that more than 90 percent of the bird's riparian habitat in the west has been lost or degraded. The decline in distribution and abundance of yellow-billed cuckoo throughout the western states is believed to be due to conversion of riparian habitat to agriculture, grazing, competition from non-native plants, such as tamarisk (salt cedar), river management including altered flow and sediment regime, and flood control practices such as channelization and bank protection. (USFWS Web site, 2001).

There are known occurrences of yellow-billed cuckoos in Idaho in Ada, Jefferson, Madison, Elmore, and Owyhee Counties (IDFG, 2002). The USRC is in Custer County. In northern and central Idaho, the USFWS has only four records of yellow-billed cuckoo over the last century. In southwestern Idaho, the yellow-billed cuckoo has been considered a rare, sometimes erratic, visitor, and breeder in the Snake River valley. Less than 15 sightings have been recorded in this area during the past 25 years. The yellow-billed cuckoo could easily become extirpated from the state in the near future (USFWS Web site, 2001).

The BLM has not surveyed specifically for the yellow-billed cuckoo, but there is one confirmed sighting on BLM land within the USRC area. A single bird was observed during the breeding season near Pennal Gulch. There have not been any surveys specifically for yellow-billed cuckoo in the USRC area. A wildlife biologist from the Corps made four reconnaissance trips to the project area in 2001 and 2002, during September, May, July, and late August. During these visits, the biologist determined that some of the habitat within the USRC project area is suitable for these birds, but none were observed during any of these visits.

### 6. Sockeye Salmon

Snake River sockeye salmon were listed as endangered by the NOAA Fisheries in November 20, 1991, under the ESA. Sockeye salmon are distributed throughout the western United States and Canada, historically inhabiting streams from northern California to Arctic Alaska. Snake River sockeye salmon have declined dramatically in recent years. Currently, only Redfish Lake, near Stanley, Idaho, supports a remnant anadromous run. Since 1990, only 16 adult sockeye salmon have returned to Redfish Lake Creek. Access to inland streams, lakes, and the Pacific Ocean is essential for completion of life histories of all stocks. The stock found in the Upper Salmon River, which spawns and rears in Redfish Lake near Stanley, Idaho, and in other lakes in the vicinity, must migrate the length of the Salmon River, much of the lower Snake River, and several hundred miles of the Columbia River before accessing the ocean for completion of its maturity phase. Sockeye adults enter the Columbia River in June or July. Those that survive reach their spawning destination at Redfish Lake in August. They take four to eight weeks preparing to spawn, which occurs in October. Sockeye salmon migrate through Round Valley some time from July through the first part of August, using the main stem Salmon River only. Juvenile sockeye migrate to the ocean from April through June, after spending 1 to 3 years in lakes. No spawning or rearing occurs in waters within Round Valley or the tributaries that flow into the Salmon River within the valley. Wild populations are virtually non-existent at this time. The single sockeye salmon stock is being artificially sustained by hatchery supplementation at the Sawtooth Hatchery near Stanley, Idaho. Annual wild stock escapements have been less than 10 for the past decade, with escapements of zero in several of those years (BLM, 1998).

Habitat requirements for this species include (a) unimpeded migration, including access to spawning lakes and rearing streams, and (b) clean, cool water and appropriate size spawning substrates free of sediment. Streamside cover is essential for maintaining appropriate water temperatures, maintaining large and small woody debris, and ensuring that sediment remains near natural levels. An important factor is lake habitat productivity and quality. A near natural habitat quality is required to maintain these stocks.

Critical habitat for sockeye salmon, designated by NOAA Fisheries in 1993, included five lakes (Redfish, Stanley, Alturas, Pettit, and Yellowbelly) in the SNRA and all of their connecting tributaries, including the main stem Salmon River (DEQ, 2001).

Inventories and/or surveys for sockeye salmon have not been conducted in the Salmon River near Round Valley, because sockeye salmon are only found as migrants within the main Salmon River.

### 7. Snake River Spring/Summer Chinook Salmon

The NOAA Fisheries listed Snake River spring and summer chinook salmon as a threatened species in April 1992. Virtually every stream available to spring/summer chinook salmon was historically used for migration, spawning, or rearing. These areas are currently designated as critical habitat for chinook salmon (FR, December 28, 1993).

Chinook salmon use the main stem of the Salmon River in Round Valley as a migration path for rearing and infrequently as a spawning area. Aerial redd counts that were completed by IDFG in 1999, 2000, and 2001 between the Highway 93 bridge just south of Challis to the mouth of the Pahsimeroi River recorded zero to 2 redds per year (Personal communication, Tom Curet, IDFG).

Few stocks of chinook salmon in the Salmon River drainage continue to have pristine spawning and rearing habitat. Irrigation, mining, commercial fishing, and dams in the Lower Snake and Columbia Rivers have contributed to the decline in returns of anadromous fish to the Salmon River. Habitat degradation by livestock, mining, road building, logging, agriculture diversions, and return flows have also contributed significantly to reductions in chinook stocks. The IDFG redd counts conducted in the main Salmon River over the last 30 years indicate a declining trend. Populations of spring/summer chinook in the Salmon River Subbasin have declined drastically and steadily since about 1960. This holds true despite substantial capacities of watersheds within the subbasin to produce natural smolts and significant hatchery augmentation of many populations.

The total number of spring and summer chinook redds counted by IDFG in survey areas ranged from 11,704 in 1957 to 166 in 1995. Chinook redds counted in all of the subbasin’s monitored spawning areas have averaged only 1,044 since 1980, compared to an average 6,524 before 1970 (DEQ, 2001).

In the mid-1900s, the Salmon River Subbasin produced an estimated 39 percent of the spring chinook and 45 percent of the summer chinook salmon that returned as adults to the mouth of the Columbia River. Natural escapements approached 100,000 spring and summer chinook from 1955 to 1960, with total escapements declining to an average of about 49,300 (average of 29,300 spring chinook salmon and 20,000 summer chinook salmon) during the 1960s. Smolt production within the Salmon River Subbasin is estimated to have ranged from about 1.5 million to 3.4 million fish between 1964 and 1970. The Salmon River Subbasin summary team estimated the parr carrying capacity of the Upper Salmon River Basin to be approximately 2.6 million spring chinook and 1.2 million summer chinook. This summary identified 36 mi (58 km) of suitable spawning and rearing habitat in excellent condition within the Upper Salmon River hydrologic unit (which includes the project area). It also assessed the general condition of this reach as follows: 157 mi (253 km) in good condition, 162 mi (261 km) in fair condition, and 34 mi (55 km) in poor condition (DEQ, 2003). The IDFG conducts aerial redd surveys for chinook salmon that include the 12-mile reach of the river.

Most chinook salmon leave the ocean and begin their migration upstream between 4 and 6 years of age. The migration begins in January with the chinook adults arriving in the Upper Salmon River from May through July. The majority of spring run chinook enter the Columbia River in March and April. They begin to arrive in the Upper Salmon

River in late July and August.  The adults “stage” near where they will eventually spawn, using deep pools, and log jams in the main channel.  The water depth in pools will generally be 5 ft (1.5 m) or more with variable water velocities.  Within the USRC, the pools formed below barbs or adjacent to riprap and bedrock banks are examples of this type of habitat.  Beginning in late July through late August, the fish move into the smaller tributaries to begin spawning.  Spawning occurs within the main Salmon River through late September.

Suitable spawning substrate that ranges in size from 2 to 3 inches (5 to 7.6 cm) in diameter is the most commonly used in the Salmon River from Round Valley up to Stanley.  Gradation ranges from 1 to 4 inches (2.5 to 10 cm), and the substrate must be stable to avoid shifting and damaging the eggs.  However, much of the substrate in this reach of the Salmon River is larger, in the range of 6 inches (15 cm) or more.  The typical conditions in the 12-mile reach, where limited chinook spawning has occurred, are in very gradual tail-out pools with oversized cobbles that are often choked with sediment.  Preferred water depth for spawning is generally less than 36 inches (91.4 cm) and more than 20 inches (50 cm).  Many of the spawning redds are found in the tail of a pool and occasionally within long runs, with a water velocity of more than 3 fps (0.91 mps).  Optimum water temperature ranges from 5.5 $^{o}$C (42 $^{o}$F) to 10.5 $^{o}$C (51 $^{o}$F), with the upper limit of 16 $^{o}$C (60.8 $^{o}$F).

Chinook fry emerge from the gravel in March and rear for approximately 1 year.  During their first summer, fry and parr from the Upper Salmon River Basin rear in their natal streams and the main river.  During the fall, they begin migrating to the lower reaches of the main Salmon River for overwintering.  Optimum water temperatures range from 11.6 to 15.5 $^{o}$C (53 to 60 $^{o}$F), with an upper limit of 25 $^{o}$C (77 $^{o}$F) for short time periods.  Side channels and slack water areas provide optimum rearing conditions and typically provide a variety of habitat features that offer protection for the juvenile fish from predators.  Heron, otters, and kingfishers are primary terrestrial predators on fry and parr in the USRC reach.  Larger fish such as the northern pike minnow and large rainbow trout are the primary fish predators on fry and parr.  Cover features in the main channel that the fry use are the spaces between cobble and boulders and fallen trees along the bank.  Chinook fry and parr generally use water that is less than 4 ft (1.2 m) deep.

During the spring and summer, juvenile fish are primarily concentrated in back water areas such as side channels and in the main channel near the edge where velocities are lower.  During the winter, the fish move to deeper water in the main channel and shelter in the interstitial spaces in the substrate of the channel bed, consequently, sediment-free substrate is important.  The side channels provide important places for both rearing and refuge during flood events.  Good examples of side channel habitat in the USRC are the Hannah Sloughs and the slough near the Sportsman’s Access on the Pennal Gulch property.  More common rearing habitat within the USRC is shallow pools around 2 ft (0.61 m) deep with low water velocities.

Generally, chinook smolt leave the area in their second year of life, and spend 2, 3, or 4 years in the ocean.  The exception to this is the jack salmon (99 percent male population) that spend only 1 year in the ocean before returning.  Smolt move to the faster portions of the river and begin their seaward migration in the spring of the year, from February through May.  They travel mainly at night, probably to avoid predators. Water depths vary and a channel free of obstructions is the main feature necessary for migration.

Historically, approximately 50 streams in the Challis RA, including Round Valley, were accessible and probably used to some extent at some time of the year for migration, spawning, or rearing.  Within the Challis RA of the BLM, only 12 of the historically occupied streams currently contain chinook salmon.  Of these, only Herd Creek, a tributary of the East Fork Salmon River (upstream of Round Valley), contains a spawning population on public lands.  All others are now used for rearing or migration. There are little data on numbers present in any of these streams, but it is known that as recently as the 1960s, Herd Creek had several hundred redds and the East Fork Salmon River had even more (BLM, 1998).

### 8. Snake River Steelhead

The NOAA Fisheries listed the Snake River steelhead as a threatened species in September 1997.  Both A and B run steelhead are present in the Salmon River. Spawning by wild A-run fish occurs mostly in Salmon River tributaries below the North Fork Salmon River with the exception of the Middle and South Forks of the Salmon River, which support spawning by wild B-run fish.  The USRC area is upstream of the South, Middle, and North Forks of the Salmon River.  Areas of the subbasin upstream of the Middle Fork have been stocked with hatchery steelhead, and the IDFG has classified these runs of steelhead as natural.  Naturally produced steelhead, upstream of the Middle Fork (including the 12-mile reach), are classified as A-run fish, based on characteristics of size, ocean age, and timing of migration.  (DEQ, 2003).

Recent and historical data on the spawning populations of steelhead in specific streams within the Salmon River Subbasin, including the USRC, are very limited.  Steelhead use the USRC area for adult holding and as a rearing area for juveniles.  Professional judgment and observations by local biologists indicate that some spawning occurs in the 12-mile reach, all by hatchery steelhead.  (Personal communication, Tom Curet, IDFG, November 2002).  Historically, an estimated 55 percent of all Columbia River steelhead originated from the Snake River Basin, which includes the Salmon River Basin.

Monitoring data from subbasins within the Mountain Snake Province (of which the Salmon River Subbasin is a primary component) shows a general decline in parr densities for steelhead.  The Salmon River Subbasin summary team estimated the parr carrying capacity of the Upper Salmon River Basin to be approximately 1.2 million steelhead.

This summary identified 117 mi (188 km) of suitable spawning and rearing habitat in excellent condition within the Upper Salmon River hydrologic unit (which includes the USRC). It also assessed the general condition of this reach as follows: 253 mi (407 km) in good condition, 175 mi (282 km) in fair condition, and 38 mi (61 km) in poor condition (DEQ, 2001).

Adult migration requirements are generally similar to those described for spring/summer chinook salmon. However, adult holding takes place over a much longer period (from fall arrival in the Snake River drainage until spring spawning). Holding generally takes place in streams greater than 100 ft (30 m) wide, and in channels with gradients less than 1.5 percent. Pools greater than 5 ft (1.5 m) deep are significant features associated with suitable holding habitat.

Steelhead spawn in the Upper Salmon River from April through June. Cool, clean water is required across all ecologic strata for successful spawning and incubation. Steelhead frequently spawn in pool tail-outs, similar to spring/summer chinook. However, steelhead do not spawn much in the main channel. They make more use of smaller spawning areas, generally using small tributaries and side channels. They also use long runs and areas of spring upwelling. The substrate size is 1 to 3 inches (0.3 to 7.6 cm) in diameter and it must be stable to avoid shifting and damaging the eggs. The typical conditions in the 12-mile reach, where limited steelhead spawning has occurred, are in very gradual tail-out pools with oversized cobbles that are choked with sediment. Water depth is usually between 1 and 2 ft (0.3 to 0.6 m). The optimum range for water temperature is between 10 and 15.5 $^{o}$C (50 and 60 $^{o}$F).

Steelhead fry emerge from the gravel in June and July, depending on water temperatures. They rear in natal streams, in the main channel of the Salmon River where slower water velocities occur, and in side channels during their first summer. Optimum water temperatures are between 11.6 and 15.5 $^{o}$C (53 and 60 $^{o}$F), with an upper limit of about 25 $^{o}$C (77 $^{o}$F) for a short period. In the tributaries, otters, herons, and kingfishers are the primary terrestrial predators. Large fish such as northern pike minnow and larger rainbow trout are the primary fish predators on fry and parr. Complex habitat such as debris piles and bank overhangs are important shelters from the terrestrial predators. During the 1 to 3 years of juvenile freshwater residence, the fry/parr seek cover in pocket water off the swift streamflow of the tributaries.

While the fry/parr are in the main channel of the Salmon River they seek shelter near the edge of the river. During the winter, the fry/parr shelter in the interstitial spaces in the substrate of the channel bed (consequently, sediment-free substrate is important).

Good examples of side channel habitat in the USRC are the Hannah Sloughs and the slough near the Sportsman's Access on Pennal Gulch property. More common rearing habitat within the USRC is shallow pools around 2 ft (0.6 m) deep with low water velocities.

Steelhead generally require 2 to 3 years of summer rearing periods before outmigration. During the fall of their second or third year, they begin migrating to the lower reaches of the Salmon River for overwintering. Seaward migration for steelhead begins in late spring generally coinciding with runoff. Optimum water temperatures are the same as for fry and parr. They travel at night mainly, probably to avoid predators. Water depths vary and a channel free of obstructions is the main feature necessary for migration.

Adult steelhead migrate back into the Salmon River Basin arriving in January and February after 2 to 3 years in the ocean. Optimum water temperatures are the same as for fry and parr. Complex habitat features such as deep pools and fallen trees provide protection from predators. Steelhead hold in pool-like runs that are usually less than 4 ft (1.2 m) deep but more than 2 ft (0.6 m) deep, with uniform flows across the channel. A common example of this type of habitat in the USRC area is the run areas between Fuller Gulch and Gerry Creek and near the Hannah Slough Two project reach.

Extensive inventories and surveys of steelhead have been conducted by various State and Federal agencies. Although the emphasis of most of the inventories was primarily to identify the distribution of chinook salmon habitat, the information gathered was also pertinent to management of steelhead, because they use virtually the same spawning and rearing habitats as chinook. Nearly every stream accessible to steelhead in the Challis RA was used for migration, spawning, or rearing. These historic use areas have not been formally designated as critical habitat, but if they are, critical habitat areas are expected to coincide with designated chinook salmon habitat. Historically, approximately 50 streams in the Challis RA were accessible and probably used to some extent at some time of the year for steelhead migration, spawning, or rearing. Within the Challis RA, at least 16 of the historically occupied streams currently contain steelhead. Of these, three are tributaries within the 12-mile reach: Morgan Creek, Challis Creek, and Garden Creek. These streams, as well as the main stem of the Upper Salmon River, contain populations of spawning steelhead. The remaining streams are used for rearing. Only minimal data are available on the steelhead numbers present in any of these streams (BLM, 1998).

**5.2.5 Water Quality.** The Upper Salmon River water quality is relatively good. Degradation from sedimentation and high concentrations of nutrients and metals has occurred in some streams, particularly in watersheds that have been affected by improper road construction and location, past mining activities, and improper livestock grazing (State of Idaho, 1999).

Streams occurring in the Salmon and Challis zones reflected differences between their water quality conditions for the year 1996. Most of the streams sampled in 1996 fully met State Beneficial Use Temperature Criteria for Coldwater Biota stratified by rearing/fall spawning life stages [U.S. Department of Agriculture (USDA), 1996]. Not all streams however, were able to meet temperature criteria for salmonid spawning. The main stem of the Upper Salmon River through the Round Valley, however, is not currently impaired for temperature, sediment, or other characteristics, as identified by the 303d impaired water body listing.

Temperature is not identified as a TMDL pollutant for the 12-mile reach (DEQ, 2003). Optimum water temperature for rearing chinook fry is 11.7 $^{o}$C to 15.6 $^{o}$C (53 $^{o}$F to 60 $^{o}$F) and for rearing steelhead fry is 12 $^{o}$C to 18 $^{o}$C (53.6 $^{o}$F to 64.4 $^{o}$F). During the summer and fall of 2002, average daily temperatures reached 18 $^{o}$C (64.4 $^{o}$F) with 20-minute spikes of 23 $^{o}$C (73.4 $^{o}$F) on several days (King, 2002). While the temperatures in 2002 and prior were not lethal, they exceeded optimal rearing temperatures.

**5.2.6 Wetlands.** There are several wetland classes. These classes include open water, aquatic bed, emergent, scrub shrub, and forested. Emergent wetlands are separated into low quality and high quality. Low quality emergent wetlands consist of reed canary grass and other non-native species. High quality emergent wetlands consist of native species, such as cattails and willows.

Riverine habitat is used to describe the stream channel, including unconsolidated shore. The open water wetland class is any area of standing water present for more than 1 month per year. These open water wetland areas are small and localized, and during dry periods of the year, difficult to locate when standing water is not present.

There are two sites containing open water wetlands. One large body occurs on the Hot Springs Site 3 property. A second large body is found on the Pennal Gulch Site 4 property, where a wetland formed when the channel was disconnected. The other sites do not have large bodies of open water wetlands. There are small, localized areas where standing water is present for more than one month per year. These small open water wetlands are difficult to locate during dry periods of the year when standing water is not present.

The wetland on the Hammond (Hot Springs) property is approximately 2.5 acres and was originally constructed as a water storage and recreation reservoir. The reservoir acts as a sediment trap for sediment-laden excess irrigation water. The reservoir was originally 8 to 12 ft (2.4 to 3.7 m) deep and was last dredged in 1977. The reservoir has nearly reached its sediment-holding capacity and is expected to require redredging in the near future. If the reservoir is not dredged, there is potential that the sediment will eventually begin accumulating in the creek and further impair creek water quality conditions.

The outlet from the reservoir is impassible to small fish migrating upstream from the river. The temperature of water exiting the reservoir is very high in the summer [approximately 21.1 $^{o}$C; -12.2 $^{o}$C (70 $^{o}$F; 10 $^{o}$F) above incoming temperature]. The warm water leaving the reservoir may affect the upstream migration of anadromous fish.

The other wetland is located at Pennal Gulch Site 4 and is approximately 4 acres in size. It is located in close proximity to the river where a relic secondary channel previously reconnected with the main stem. The wetland is hydrologically connected to the river and fluctuates to some extent with the river's water surface elevation. Beaver dams are prevalent in the remnant channel, upstream from the wetland. Large flow events, from 2,000 to 5,000 cfs (56.6 to 141.6 $m^3/s$), do not occur that would otherwise breach beaver dams, knock down precarious trees, and form debris.

**5.2.7 Air Quality.** The air quality in the Challis area is generally good because of the adequate air circulation and the lack of nearby urbanization. Periods of low air quality can stem from local events, such as debris burning, wind blown dust, or wintertime temperature inversions that trap pollutants close to the ground. Prevailing winds come from the north. They are generally light, but occasional damaging windstorms can occur during the winter. Average wind speeds range from 4 to 6 mi per hour (6.4 to 9.6 km per hour).

## 5.3 Cultural Resources

Section 106 investigations for the Upper Salmon River restoration project consisted of a file search for existing cultural resources information (*i.e.*, prehistory and history) on the area of potential effect (APE). It also included a systematic survey of the project lands depicted in plate 3.

The survey was conducted by archaeologists walking transects spaced at a maximum distance of 100 ft (30 m) apart over the 5 parcels of land currently included in the study. Cultural resources sites were recorded whenever 10 or more artifacts were found within 100 ft (30 m) of one another and separated from other sites by at least 100 ft (30 m). Sites could also be defined based on topographic features or when the possibility of subsurface cultural deposits existed. Isolated finds (isolates) were defined as fewer than 10 artifacts within 100 ft (30 m) of one another and separated from other sites by at least 100 ft (30 m).

While the prehistory and ethnohistory of the APE suggest a high potential for the discovery of prehistoric sites along the Salmon River, this was not supported by the survey results. The project area has been extremely altered by streambank and channel erosion and heavy agricultural use. The dense riparian vegetation prohibited close survey inspections at many locations. Gravel bars offered little potential for intact buried deposits or features that would suggest the presence of more complex sites.

Four historic sites related to early settlement and two prehistoric isolates were recorded within the APE. Each of the two isolates and four historic sites were assessed for National Register of Historic Places (NRHP) eligibility. Only one site, the Hammond Property at Challis Hot Springs, was determined to be NRHP eligible. Out of the five features associated with the Hammond Property, only feature 1 (earthen dam and outlet structure) would be impacted by proposed project activities. However, because of prior disturbance and alteration, the Corps made a determination that feature 1 is not a contributing element to the site's NRHP eligibility and, therefore, proposed work should not adversely affect the site. The Corps has made a “No Adverse Effect” determination for the Salmon River Restoration Project and requested concurrence from the Idaho

State Historic Preservation Office (SHPO). Work would not proceed until Section 106 compliance requirements are met.

### 5.4 Aesthetics/Visual Quality

The project area is in a rural valley and is located approximately 3 to 4 mi (5 to 6 km) from the town of Challis. The Upper Salmon River flows roughly northward toward the town of Salmon within the surrounding mountain terrain. The river is primarily surrounded by private property, but public access through Sportsman's Access and others provide for scenic opportunities for the public. Trees and lush greenery along the river contrast the drier, open agricultural and natural surroundings.

### 5.5 Recreation

Three of the project sites (Dunfee Slough, One Mile Island, and Hot Springs) are entirely on private property and do not provide for public outdoor recreation opportunities, except for Hot Springs, which is on a fee basis. Pennal Gulch and Highway 93 bridge are BLM properties, which provide for sportmans' access. Highway 93 bridge site also provides for boat launching and limited OHV usage.

In the nearby vicinity, warm temperatures and low precipitation during the summer attract many visitors to the area. Some of the activities people enjoy are fishing, hunting, hiking, swimming, rafting, and canoeing. In the winter, recreational opportunities include hunting and hiking.

### 5.6 Transportation and Noise

Highway 93 is the main transportation route immediately adjacent to the proposed project. Plate 2 shows the local transportation routes in the area. Heavy truck traffic would increase during the construction period. Approximately 1,200 to 2,000 (917 to 1529 $m^3$) of construction material would be hauled to the five sites. At 8 cy (6 $m^3$) per truck, there would be approximately 150 to 250 truckloads. Construction work would create noise during working hours.

### 5.7 Utilities

With one exception, public and private utilities (*i.e.*, electrical, water, and sewer) are not located within in the project area. At Hot Springs Site 3, there is a line of electrical power poles that runs through the project area along the property line of the two owners (near the match line on plates 10 and 11) where the new road would be located to access the proposed treatment pond. Project work in that location will need to work around the poles.

### 5.8 Land Use

About 95 percent of the land is publicly owned with about 75 percent administered by USFS and 20 percent administered by BLM. The SNRA (35 percent), Salmon-Challis

National Forest (34 percent), BLM Challis RA (24 percent), and the State of Idaho (2 percent) share the public lands. The remaining 5 percent is privately owned land, mostly in the Stanley Basin, at scattered locations along the Salmon River and the East Fork Salmon River in Round Valley and at Challis.

Lands adjacent to the river through the 12-mile reach are primarily privately owned agricultural properties utilized for ranching, grazing, and farming with typical crops including pasture, hay, and small grains, such as wheat. There is also a trend toward new homes and subdivisions causing encroachment on the river (King, 2002). The Salmon River at Round Valley is dominantly affected by in-stream channel work to stabilize banks and diversions, home development on flood plains, livestock grazing, and encroachment by agriculture (CCWG, 1998).

### 5.9 Socio-Economics

The Upper Salmon River area is sparsely populated. The largest city within the subbasin is Challis, with a population of 1,072 (Idaho Department of Commerce and Labor, 2000). Smaller towns include Stanley and Clayton. Ranching, farming, mining, government, and recreation/tourism account for the livelihood of most residents.

Custer County was established January 8, 1881, with its county seat at Challis. The county was named for the General Custer mine, which was named in honor of General George Custer, who died at the Battle of Little Bighorn. Beginning in 1824, fur traders and pathfinders came through the area and later in the 1860s and 1870s prospectors and miners came. Surrounding counties that could be affected by this project are: Idaho, Boise, Valley, and Lemhi counties as shown in figure 5-7.

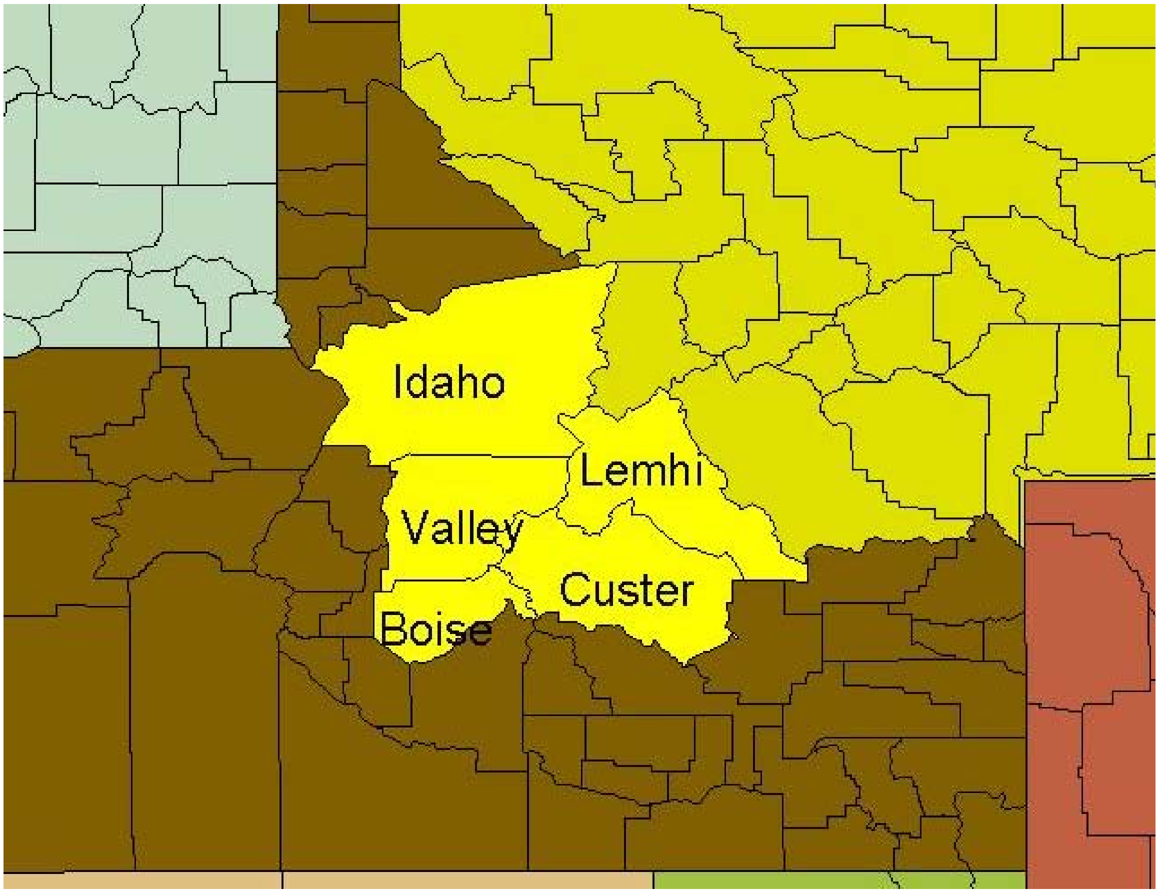



**Figure 5-7 Counties in Idaho located Near the Project.**

Custer County showed an average annual increase in population of 1.28 percent from 1970 to 2000 (table 5-5). Idaho State showed an average annual increase of population of 2.0 percent over the same period. Custer County growth rate has been only two-thirds (66 percent) of the State growth rate.

**Table 5-5 Comparative Total Population for Custer County and State of Idaho.**

| | **Total Population** | | | |
|---|---|---|---|---|
| | 1970 | 1980 | 1990 | 2000 |
| Custer County | 2,967 | 3,385 | 4,133 | 4,342 |
| State of Idaho | 712,567 | 943,935 | 1,006,749 | 1,293,953 |

Source: U.S. Bureau of Census, Estimates of the Population of Counties: 1970-2000.

Population density (table 5-6) is measured by population per square mile. Custer County is among the lowest populated counties of the State. Most people live in the north central area near the Sawtooth Mountains (figure 5-8). The State capital is in Ada County with over 50 people per square mile, while Custer County has no more than 2.5 people per square mile.

**Table 5-6 Population Density in the Year 2000.**

| | Population per Square Mile | |
|---|---|---|
| County | Minimum | Maximum |
| Custer | 0 | 2.5 |
| Ada | 50 | 285 |

Source: U.S. Bureau of Census, Estimates of the Population of Counties: 2000.

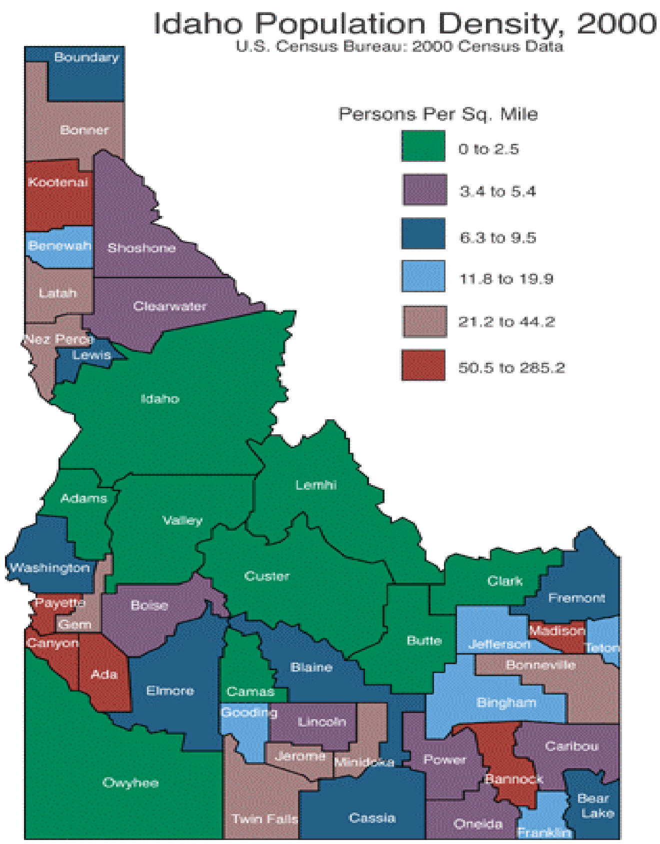


**Figure 5-8 Counties in Idaho Population Density, 2000.**

The education level for Custer County is comparable to the State of Idaho (see table 5-7). Forty-seven percent of both Custer County and the State of Idaho have attained an educational level greater than high school.

**Table 5-7 Comparative Educational Accomplishments for Custer County and State of Idaho.**

| Education Attained | Idaho | % Total | Custer County, Idaho | % Total |
|---|---|---|---|---|
| Less than 9th grade | 171,311 | 5.48% | 4,263 | 6.13% |
| 9th to 12th grade, no diploma | 334,472 | 10.70% | 6,942 | 9.99% |
| High school graduate (includes equivalency) | 873,150 | 27.93% | 19,221 | 27.65% |
| Some college, no degree | 782,010 | 25.01% | 16,877 | 24.28% |
| Associate degree | 248,478 | 7.95% | 6,015 | 8.65% |
| Bachelor's degree | 496,866 | 15.89% | 10,770 | 15.49% |
| Graduate or professional degree | 220,103 | 7.04% | 5423 | 7.80% |
| Total attending school | 3,126,390 | 100.00% | 69,511 | 100.00% |
| Sum of person with greater than high school | 1,498,979 | 47.95% | 33,070 | 47.58% |

The proportion of people below the poverty level in Custer County (12 percent) is nearly the same as the State of Idaho (13 percent) (USBC, 1997).

Earnings by persons employed in Custer County decreased from $54.8 million in 1998 to $52.7 million in 1999, a decrease of 3.9 percent. The largest industries in 1999 were mining; state and local government, 14.7 percent; and services. Agriculture is included in total but is not the leader. The total personal income (TPI) from all sources was $94.4 million or about $23,000 per capita. Of the industries that accounted for at least 5 percent of earnings in 1999, the slowest growing from 1998 to 1999 was mining, which decreased 12.0 percent. The fastest was retail trade (9.6 percent of earnings in 1999), which increased 5.3 percent. (Department of Commerce, 2002).

Table 5-8 shows the unemployment percentages for Custer County. Mining employment has been hit hard recently with layoffs at the Thompson Creek Mine (molybdenum) and Grouse Creek Mine (gold). Increases in retail trade employment are tempering the losses of jobs in mining. The retail trade industry in 1999 accounted for nearly 10 percent of industrial earnings.

**Table 5-8 Unemployment Percentages in Custer County.**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentile | 4.8 | 6.5 | 9.6 | 15.3 | 8.3 | 5.8 | 6.1 | 7.0 | 8.6 | 8.2 | 7.1 |

Table 5-9 shows the commuting statistics for Custer County. A majority of workers (85 percent) work inside the county boundary. Approximately 8 percent work in counties of Lemhi (Salmon, Idaho) and Butte County, Idaho (Idaho National Engineering Lab).

**Table 5-9 Commuting Patterns in Custer County.**

| | Custer County, Washington |
|---|---|
| Worked in county of residence | 1548 |
| Worked outside county of residence | 277 |
| Worked outside State of residence | 0 |

U.S. Bureau of the Census 2000 Census of Population and Housing in 1999 (USBC, 2000), Custer had a TPI of $94.4 million ($23,000 per capital personal income). This TPI ranked 36th in the State and accounted for 0.3 percent of the State total. The 1999 TPI reflected an increase of 3.0 percent from 1998. The 1998-99 State change was 6.1 percent, while the national change was 5.4 percent.

The TPI includes the earnings (wages and salaries, other labor income, and proprietors' income); dividends, interest, and rent; and transfer payments received by the residents of Custer. In 1999, earnings were 61.2 percent of TPI; dividends, interest, and rent were 25.7 percent; and transfer payments were 13.0 percent. From 1998 to 1999, earnings increased 3.7 percent; dividends, interest, and rent increased 2.5 percent; and transfer payments increased 0.7 percent (U.S. Department of Commerce, 2002).

The Salmon River is noted for its recreational activities. The Lower Snake River Juvenile Salmon Migration Feasibility Study (page I3-43, appendix B of Corps, 1999) states that annual benefits from steelhead fishing at $4.8 million (129,026 trips at $37.68 per trip at 1998 price level) and $43.4 million (497,480 trips at $87.24 per trip) annual benefits for general recreation in central Idaho. This project would help stabilize the fisheries ecosystems, which support this segment of the economy. Custer County land mass is 20 percent of the total central Idaho recreational area comprised of five counties surrounding the Salmon River Basin (Idaho, Valley, Lemhi, Custer, and Boise). If this percentage is applied to the steelhead fishing and general recreation revenues, Custer County can be expected to generate nearly $10 million recreational revenues each year just to maintain the status quo. These are direct revenues brought into the local county economy and do not count the multiplier effect of dollars generated through other business sectors affected by recreation dollars. Approximately 20 percent of jobs listed are related to recreation related industries (food, hotel, and cafes for base year 1994).

Farm income in Custer County has historically comprised only 1 to 1.5 percent of total income, while in the State of Idaho, farm income has historically comprised about over 3 percent of the total income (see table 5-10). Non-farm income has experienced an average annual growth of nearly 5 percent for the State of Idaho, while annual non-farm income in Custer County has increased only 3 percent from 1995 through 1999. Farm income per acre for Idaho counties range from a low of $30 per acre (Clearwater County, 1987 database) to a high of $628 (Jerome County). The average income per acre for the State of Idaho is $151. The range for one standard error from the mean is

$98 to $205 income per acre, which comprises 68 percent of the cases. Custer County ranks in the lower 16 percent of the cases. Strict agricultural acreage allocated to crops comprises only 3.7 percent of all land (93 percent of Idaho is Federal lands and 66 percent of the total land is national forests). Table 5-10 shows total farm and non-farm income ($1,000) for Custer County and the State of Idaho.

**Table 5-10 Comparative Farm and Non-Farm Income for Custer County and State of Idaho.**

| ($1,000) | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|
| Custer County Farm Income | 1,060 | -905 | 3,227 | 3,438 | 1,656 |
| State of Idaho Farm Income | 796,385 | 875,611 | 669,118 | 892,281 | 940,864 |
| | | | | | |
| Custer County Non-Farm Income | 81,543 | 83,193 | 87,134 | 88,229 | 92,746 |
| State of Idaho Non-Farm Income | 22,072,534 | 23,297,719 | 24,557,224 | 26,984,087 | 27,686,170 |

(U.S. Department of Commerce, 2002)

Agricultural property is low in assessed value per acre when compared to residential or commercially assessed property. Property with ecosystem restoration easements would be valued less than agricultural property. The acquisition of ecosystem restoration easements would create a minimal reduction in the county's tax base. Taking agricultural property out of production also has the potential for reducing local economic revenue through lost agricultural products and associated economic activities, such as equipment sales and local services. The amount of land removed from agricultural purposes by the proposed project would be minor in relationship to lands remaining available for these uses in the general area.

The comparative Community Economic Health analysis in table 5-11 shows Custer County ranks near the bottom of the lower 16 percent of the counties analyzed in the chart (index=0.36). The average economic health index was 0.55 (Umatilla County, Oregon, and Elmore County, Idaho, depicted in orange). The range in one standard error from the mean (depicted in green), in those county communities analyzed, was 0.51 on the high side (Deschutes County, Oregon) and 0.51 on the low side (Malhuer County, Oregon). This analysis uses various economic indicators, such as human attraction to the area in terms of population growth, per capita productivity (measures how effective does the community turn its asset base into sales dollars); per capita income; percentage of unemployment; and business diversity. The productivity index of 5,650 means that sales in Custer County represent only 56 percent of its asset investment base (index of 10,000 means sales each year are equal to value of the county's assets). In other words, there is room for growth in revenues without new investments.

The project would not disproportionately affect minority or low-income populations. It would not involve constructing a facility that would discharge pollutants or contaminants, and, thus, no human health effects would occur. Nor would it have a negative affect on real estate property values that could disadvantage minority or low-income populations.

In all likelihood, the project would improve conditions for minority or low-income populations by improving the economic conditions in the region, as described earlier.

## Table 5-11 Community Economic Health Indicators.

Community Economic Health Indicators

| Place | Total Growth Index 10n | Popul 1990 | Popul2000 | Asset Value 1999 (no public prop) | Total Output $ 2000 (incl public output) | Per Capita Productivity: Productivity Ratio/perCap (annual sales/assets) 10000=sales/assets=1.0 | PerCap Income: Per Cap Income (1999) | Business Diversity: Bus Sect's out of'541 100% div 54,100 | Cumulative Index | Human Attraction: Adjust for Population Growth | Cumulative Index After Popu Adjustment | Unemployment Percentage Id02,Or98,Wa02 | Index Adusted Unemployment Percentage | Cumulative Index After Umemploy Adjustment | Cum Index Basis =1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Applied Weight | | | | | | 45% | 5% | 25% | | 25% | | | | | |
| | | | | | (1994 to 2000pl) | | | | | | | | 1 | | |
| Ada County, Idaho | 1.7622962 | 205775 | 300904 | $15,035,601,772 | $16,729,922,000 | 11126.87 | $31,420 | 26,000 | 13078.093 | 4781 | 17859 | 3.50% | 1.29 | 22961.70 | 1.00 |
| Nez Perce Co.(Lewiston),Id | 1.4083131 | 33754 | 37410 | $1,982,814,337 | $2,630,432,400 | 13266.16 | $24,519 | 14,800 | 10895.720 | 3019 | 13915 | 3.90% | 1.26 | 17482.56 | 0.76 |
| Benton Co.,Wa | 1.5657694 | 112560 | 142475 | $6,679,378,806 | $7,506,204,000 | 11237.88 | $25,004 | 18,500 | 10932.245 | 3459 | 14392 | 8.10% | 1.12 | 16168.42 | 0.70 |
| Bingham Co(Blackfoot),Id | 1.4104755 | 37583 | 41735 | $1,086,550,199 | $1,368,800,000 | 12597.67 | $17,621 | 13,300 | 9875.001 | 2741 | 12616 | 4.60% | 1.22 | 15359.20 | 0.67 |
| Cassia Co(Burley),Id | 1.3964571 | 19532 | 21416 | $853,130,410 | $1,023,397,480 | 11995.79 | $21,170 | 11,900 | 9431.606 | 2585 | 12017 | 5.50% | 1.18 | 14201.84 | 0.62 |
| Whitman Co(Colfax),Wa | 1.350677 | 38775 | 40740 | $1,744,593,764 | $1,250,190,702 | 7166.08 | $19,082 | 12,100 | 7203.838 | 1892 | 9096 | 1.80% | 1.56 | 14149.43 | 0.62 |
| Franklin Co(Pasco),Wa | 1.6168681 | 37473 | 49347 | $2,038,362,584 | $2,186,909,764 | 10728.76 | $17,961 | 13,900 | 9200.991 | 3029 | 12230 | 9.50% | 1.11 | 13517.49 | 0.59 |
| Deschutes Co, Or (Bend) | 1.7234638 | 74958 | 106700 | $10,041,000,000 | $4,406,065,531 | 4388.07 | $24,784 | 21800 | 8663.833 | 3083 | 11747 | 7.70% | 1.13 | 13272.58 | 0.58 |
| Walla Walla Co.(Walla Walla),Wa | 1.4395776 | 48439 | 55200 | $2,817,468,000 | $2,505,189,975 | 8891.64 | $21,366 | 15,700 | 8994.536 | 2562 | 11557 | 6.80% | 1.15 | 13256.59 | 0.58 |
| Payette County, Idaho | 1.5521602 | 16434 | 20578 | $596,772,403 | $666,853,152 | 11174.33 | $18,128 | 12,000 | 8934.848 | 2797 | 11732 | 8.40% | 1.12 | 13128.46 | 0.57 |
| Umatilla Co(Pendleton),OR | 1.4907036 | 59249 | 70548 | $3,627,126,000 | $2,788,708,577 | 7688.48 | $21,018 | 16,000 | 8510.716 | 2533 | 11044 | 6.80% | 1.15 | 12668.29 | 0.55 |
| Elmore County,ID | 1.6737326 | 21205 | 29130 | $713,824,747 | $657,561,844 | 9211.81 | $21,907 | 11,200 | 8040.665 | 2761 | 10802 | 6.00% | 1.17 | 12602.44 | 0.55 |
| Malhuer Co., Oregon (Ontario) | 1.4329595 | 26038 | 29,500 | $1,206,000,000 | $1,065,000,479 | 8830.85 | $25,912 | 13,200 | 8569.482 | 2427 | 10997 | 8.90% | 1.11 | 12232.29 | 0.53 |
| Asotin Co.,Wa | 1.4673388 | 17605 | 20551 | $754,305,968 | $448,895,600 | 5951.11 | $21,615 | 12,000 | 6758.748 | 1972 | 8731 | 3.40% | 1.29 | 11299.18 | 0.49 |
| Gem County, Idaho | 1.581746 | 11844 | 15181 | $463,617,256 | $398,014,000 | 8584.97 | $18,078 | 10,700 | 7442.136 | 2385 | 9827 | 7.90% | 1.13 | 11070.78 | 0.48 |
| Adams Co(Washtucna),Wa | 1.2894597 | 16603 | 16428 | $1,014,962,082 | $826,122,720 | 8139.44 | $20,941 | 9,900 | 7184.800 | 1777 | 8962 | 10.20% | 1.10 | 9840.70 | 0.43 |
| Washington County,Idaho | 1.4669006 | 8550 | 9977 | $430,062,292 | $304,228,780 | 7074.06 | $16,079 | 10,700 | 6662.278 | 1944 | 8606 | 8.80% | 1.11 | 9583.77 | 0.42 |
| Columbia Co(Dayton),Wa | 1.3099404 | 4024 | 4064 | $248,886,223 | $206,061,819 | 8279.36 | $20,257 | 7,800 | 6688.561 | 1689 | 8377 | 11.30% | 1.09 | 9118.68 | 0.40 |
| Boise County, Idaho | 2.2008264 | 3509 | 6670 | $336,419,278 | $142,199,605 | 4226.86 | $21,492 | 8,100 | 5001.685 | 2377 | 7379 | 5.00% | 1.20 | 8854.22 | 0.39 |
| Garfield Co(Pomeroy),Wa | 1.3662811 | 2248 | 2397 | $138,149,527 | $81,000,000 | 5863.21 | $18,237 | 7,400 | 5400.296 | 1440 | 6840 | 3.60% | 1.28 | 8739.81 | 0.38 |
| Custer Co.,Id(Challis) | 1.35057 | 4133 | 4342 | $404,302,659 | $228,444,460 | 5650.33 | $23,087 | 8,700 | 5872.000 | 1542 | 7414 | 8.20% | 1.12 | 8318.41 | 0.36 |
| Clearwater Co(Orofino),ID | 1.3499706 | 8505 | 8930 | $583,973,733 | $421,861,249 | 4849.00 | $14,743 | 10,200 | 5469.200 | 1436 | 6905 | 14.90% | 1.07 | 7368.24 | 0.32 |
| | | | | | | | | | | | | | | | |
| Min | 1.2894597 | 2248 | 2397 | 138149527 | 81000000 | 4226.856613 | 14743 | 7400 | 5001.685476 | 1435.624809 | 6839.853829 | 0.018 | | 7368.23587 | 0.32089237 |
| Max | 2.2008264 | 205775 | 300904 | 15035601772 | 16729922000 | 13266.15584 | 31420 | 26000 | 13078.09251 | 4781.011236 | 17859.10374 | 0.149 | | 22961.70481 | 1 |
| Avg | 1.5093857 | 36763.45455 | 47010.13636 | 2399877365 | 2174639279 | 8496.487889 | 21110.04545 | 12995.45455 | 8127.785459 | 2465.149532 | 10592.93499 | 0.070363636 | | 12508.86798 | 0.544770873 |
| std dev | 0.2033678 | 46247.34313 | 66424.68051 | 3677140189 | 3685827323 | 2705.703433 | 3740.434065 | 4542.6526 | 2019.552704 | 773.3542776 | 2733.988177 | 0.030599635 | | 3558.867862 | 0.154991447 |
| coef of var | 0.1347355 | 1.25797055 | 1.41298634 | 1.532220038 | 1.694914351 | 0.318449631 | 0.1771874 | 0.349557038 | 0.248475149 | 0.313714956 | 0.258095436 | 0.434878534 | | 0.284507588 | 0.284507588 |
| sample size | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | | 22 | 22 |
| sq root sample size | 4.6904158 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | 4.69041576 | | 4.69041576 | 4.69041576 |
| std/sq rt sample size | 0.0433582 | 9859.966685 | 14161.78947 | 783968922.4 | 785821025.6 | 576.8579101 | 797.4632222 | 968.4967884 | 430.5700833 | 164.879686 | 582.888238 | 0.006523864 | | 758.7531776 | 0.033044288 |
| std error(68%conf)top | 1.5527439 | 46623.42123 | 61171.92583 | 3183846288 | 2960460305 | 9073.345799 | 21907.50868 | 13963.95133 | 8558.355542 | 2630.029218 | 11175.82323 | 0.0768875 | | 13267.62116 | 0.577815161 |
| std error(68%conf)low | 1.4660276 | 26903.48786 | 32848.34689 | 1615908443 | 1388818253 | 7919.629979 | 20312.58223 | 12026.95776 | 7697.215376 | 2300.269846 | 10010.04675 | 0.063839772 | | 11750.11481 | 0.511726586 |

Umatilla County Oregon and Elmore County Idaho are highlighted in orange to represent the statistical mean while the other counties highlighted in green represent those counties within one standard error of the mean. Custer County's font was increased to illustrate where Custer County falls in line to one standard error and the mean.

The economic history of the area is an important component when measuring the health of an area and the impacts of the project alternatives. This environmental restoration project is expected to have positive impacts to this area. The main source of economic development in this area will be tourism and recreational activities. Per discussion with the USFS, the recreational area is the hope for the future in this dynamic geographic area. The opening of the steelhead season, in the past, has filled motels and cafes throughout the county.

In summary, employment and population have remained static over a period of years in the Central Sawtooth Mountains of Idaho. Mining, ranching, and government have been and are still the major sources of employment in Custer County. The main source of economic development in this area will be tourism and recreational activities. A recent interview with the USFS has shown the recreational area is the hope for the future in this dynamic geographic area. The BLM is studying a 250-mi (402-km) all terrain vehicle roadway project. The project would help stabilize the future economic growth in this remote region by maintaining and expanding existing fishery ecosystems.

# 6.0 ENVIRONMENTAL CONSEQUENCES

This chapter examines the environmental consequences for the environmental categories described in chapter 5. Categories that are considered to have no short- and long-term positive or negative impact, except for recreation, are not included in the analysis below. A summary table of the environmental consequences is shown at the end of the chapter in table 6-4. Short-term impacts are effects that would be expected in the timeframe from 0 to 5 years. Long-term impacts are effects that would be expected in the timeframe from 10 years and beyond.

## 6.1 Climate

Each of the project alternatives would have no impact on the regional climate within the project area. In the short term, each of the alternatives was considered to have a low or no positive or negative impact (0) based on microclimate impact. In the long term, constructed alternatives B, C, and D would create a favorable microclimate change due to increased side channel flows and additional shading, which would help to moderate stream temperatures providing more suitable conditions for salmonids. These alternatives were considered to have a long-term moderate positive impact on the climate (+1).

## 6.2 Topography

The project alternatives would not have a significant impact on the topography. There would be minor localized land elevation changes where excavation is necessary to create meander in the secondary channels, constructing the new wetland to treat the diverted irrigation water, and reconstructing the spring creek through the existing settling pond. The design of the topographic changes considered the existing topography in order to minimize the amount of excavation required.

Alternatives C and D were considered to have a short- and long-term moderate positive impact (+1) on the topography. Alternative B was considered to have a short-term low or no positive or negative impact (0) based on natural processes taking longer to effect topographical changes. The long-term effect of alternative B was considered a moderate positive impact (+1) on the topography.

## 6.3 Soils

Channel stabilization and habitat restoration activities would expose and compact soils at the access points for moving heavy equipment and at the stream channel construction sites to varying degrees in the short term. Care would be taken to minimize increases in the rate of soil transport and stream sedimentation and associated adverse water quality effects in these areas. Although negative stream sedimentation effects are predicted to be local and of short duration, erosion risks would be controlled by the quick re-establishment of native vegetation, planting of vegetative cover crops, or application of ground mulch as appropriate. Compacted soils would be disked and revegetated upon completion of construction activities. Upland soils would be revegetated with an appropriate mix of native grasses and herbaceous species. Riparian soils would be revegetated using seed, transplants, or nursery stock depending on site-specific conditions. As previously discussed in section 5.2.5 Water Quality, sedimentation effects would be monitored and reduced through a variety of site-specific design, timing, and sediment control techniques.

The project alternatives would have minimal affect on sediment transport. The secondary channels would be designed to pass sediment through the system. The stone sill entrance to the channel would be designed to prevent sediment accumulation in order to reduce maintenance costs. The alternatives would all increase the frequency of flooding in certain areas, which would help reduce the sediment load in the river during flood stages. Action taken to prevent erosion by providing long-term vegetation and exclude cattle would have a positive impact.

In the short term, alternative B was considered to have a low or no positive or negative impact (0) on erosion and sediment transport effects. In the long term, alternative B was considered to have a moderate positive impact (+1) since the natural process would evolve to prevent erosion. In the short and long term, alternatives C and D were considered to have a moderate positive impact (+1), since planting would accelerate the erosion prevention process.

## 6.4 Hydrology and Flood Plain Connectivity

Data from the existing 1988 FEMA study was converted from Hydrologic Engineering Center (HEC) 2 to HEC-River Analysis System (RAS) hydraulic model format. The modeling data for the FEMA FIS report, March 4, 1988 (FEMA 1988), for Custer County, Idaho, and unincorporated areas (community numbers 160053, city of Challis, Idaho, and Unincorporated Number 160211) was converted from the existing HEC-2 hydraulic model format from the existing FEMA study table 2 on page 11. Because the proposed work, under alternatives C and D, lies within a detailed FIS, a “no-rise condition” of the base flood elevation would be maintained (see appendix F).

In the short term, alternative B was considered to have a low or no positive or negative impact (0). In the long term, alternative B was considered to have a moderate positive impact (+1) by naturally achieving an improved hydraulic condition. Alternative C, in the short and long term, was considered to have a high positive impact (+2) by increasing the hydraulic capacity and flood plain connectivity, and dampening the amplitude of flood flow rates and delay and dampen the flood affect of storm water runoff (riparian affect). Alternative D, in the short and long term, was considered to have a moderate positive impact (+1) by increasing the hydraulic capacity.

## 6.5 Irrigation

Excess irrigation water can act to attract fish and other aquatic species. Unfortunately, since the amount and quality of the water cannot be predicted, aquatic species can become trapped and stranded where excess irrigation flows are reduced or eliminated. The project would install fish screens to prevent anadromous fish from being trapped in excess irrigation returns. Also, irrigation return at site 3 would be rerouted from discharging into a spring creek and treated in a wetland system before discharging to the Salmon River.

In the short and long term, alternatives C and D were considered to have a high positive impact (+2) on irrigation effects by installing fish screens to prevent fish stranding and diverting irrigation flow from a natural creek. In the short and long term, alternative B was considered to have a moderate negative impact (-1), since natural evolution would allow the plant community to adapt to the excess irrigation water, but would not alter the source of water, nor prevent fish from being stranded.

## 6.6 Aquatic Resources

The project would specifically benefit steelhead and to a lesser extent, chinook salmon, by improving a variety of vital habitat components necessary for salmonid survival in this reach of the Upper Salmon River drainage. These measures would also improve the overall functioning of the local ecosystem by reconnecting areas of the flood plain by improving the habitat conditions for a wide variety of aquatic and terrestrial species. More frequent flooding would provide additional water, sediment, and nutrients to the flood plain community. Overall, project actions would improve migration corridors, spawning habitat, rearing habitat, invertebrate habitat, and overall aquatic ecosystem function of the river system.

Alternative B was considered to have a moderate positive impact (+1) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to promote aquatic species, but would take time to develop. In the short and long term, alternatives C and D were considered to have a high positive impact (+2), as aquatic species would see immediate and sustained benefit from project improvements.

## 6.7 Vegetation

An important objective is to restore the riparian shrub community. Negative near-term effects are not anticipated because of the revegetation, fencing, and weed control activities. Because the native riparian plant species have a diversity of functions to which native fish species are adapted, restoring the original riparian vegetation would optimize conditions for population growth of native fish species. Also, native plants have evolved to survive in the Salmon River Subbasin environment. Because of the lack of a diverse native plant community in the project area, the riparian zone would be re-established to the middle-elevation community type as exists in other reaches of the Upper Salmon River. Native shrub cuttings and seed sources would be obtained within the drainage and grown to container stock size to supplement natural seed dependent revegetation under alternatives C and D.

Alternatives C and D would increase the quality and diversity of the riparian cover types now present along the Upper Salmon River. Some short-term disturbance of existing riparian vegetation could occur in localized construction areas at the time streambanks are stabilized and other construction is occurring. In the long term, control of grazing practices within the riparian corridor would allow for quicker restoration of native shrubs and herbs, and could allow hardwood trees to propagate. Because land use practices have decreased habitat values for most of the riparian cover types, longer periods may be required to restore native plant communities. Depending on local site conditions, however, it is expected that vegetation replanting and redistribution of cattle out of the riparian zone could increase fish and wildlife habitat benefits within a 3- to 5-year period. In some areas, such as inside meander bends and gravel bars, the existing sedge/rush community with its high resiliency to disturbance would recover quickly from established root systems. In heavily degraded areas, habitat improvement could require a longer period, ranging from 10 to 20 years, and take at least 3 years for an observable response. Because the continuation of uncontrolled livestock grazing is incompatible with riparian restoration, adverse vegetation effects would be avoided by constructing fences, establishing riparian pastures, or implementing other livestock management methods.

The vegetation used for bank stabilization in alternative C would be native, deciduous vegetation, including many types of willows, cottonwood, red-osier dogwood, dogbane, clematis, alder, or other native shrubs. Actual vegetative planting would be done in the fall or spring of the construction year, when these plants are dormant. The sponsor would perform follow-up measures, such as irrigation during the first summer and weed removal to optimize survival of newly planted vegetation.

From 50 to 75 trees would be removed under alternatives C and D, including several large cottonwoods, and adjacent vegetation would need to be removed for construction of the project. Mature cottonwoods and vegetation are located both upstream and downstream from the project sites, so overall impacts would be minimal. All disturbed surfaces would be reseeded upon completion of the project.

Root wads and other large woody debris, placed in conjunction with bank protection under alternative C, would result in recruitment of vegetation on those banks. During construction, vegetation protection measures identified in appendix I would be implemented at construction sites to ensure minimal impacts to existing native vegetation.

Alternative B was considered to have a moderate positive impact (+1) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to promote vegetation due to cattle exclusion, but would take time to develop. In the short and long term, alternatives C and D were considered to have a high positive impact (+2), as vegetation would recover more quickly from planting efforts, creating immediate and sustained benefit from project improvements.

### 6.8 Wildlife

Wildlife use of the area during construction would not be impacted to any significant extent. No construction, except for possible revegetation, would take place from November 1 through March 15 to limit impact to bald eagles. Tree removal would occur after July 1 to reduce impacts to nesting birds. Wildlife would be temporarily impacted by noise and other construction work and annual inspection/maintenance activities. The normal reaction of wildlife to this type of disturbance is avoidance of the area, at least temporarily. Some wildlife would become habituated to the noise and activity and remain in the area. These impacts would be short term and should have no lasting adverse effects.

The proposed actions would improve wildlife habitat. Re-establishment of the riparian vegetation, by alternatives B, C, and D, along the riverbanks, would restore and enhance usage by various wildlife species. The establishment of a more diverse vegetative cover would provide enhanced habitat for wildlife by providing shade, nesting and thermal cover, cover from predators, forage in the form of plant, insects, other invertebrates, and terrestrial and aquatic prey animals.

Due to the presence of water, restoration of native plant cover types in riverine or creek bank zones could improve wildlife habitat quality in a relatively short period or to the point of observable results within 2 to 5 years. In the long term, the restoration activities would provide increased flood plain connection and flooding frequency. Submersed vegetation may increase in these areas providing increased substrate for aquatic insects, fish, and wildlife. In the long term, the increased amount of submersed vegetation and aquatic invertebrates in the river system would benefit waterfowl and other avian species that feed on these plants and animals in direct proportion to the amount of food supply available. Over time, restoration of habitat adjacent to riverine areas would provide increased cover for elk and deer and contribute to improved water quantity and quality. As open water areas such as off-channel ponds, wetted lowland areas, and low velocity areas within the stream channel are expanded, habitat quality for smaller species, such as birds; small mammals; reptiles; and amphibians would increase.

Cattle exclusion, or reduced usage, under all of the alternatives, would lessen the problems of bank erosion by promoting or allowing riparian shrubs to revegetate and stabilize banks. Changes in livestock distribution should increase plant cover, improving wildlife benefits within a 3- to 5-year period, and ensure that wildlife populations are not further reduced. Over time, as native trees are re-established and allowed to mature, cavity dependent birds, such as mountain bluebird and Lewis' woodpeckers, could be provided with increased nesting habitat. Perching birds and raptors would benefit from any increased diversity of forest layers.

Wildlife disturbances due to construction of stream channels, flood plains, and other habitat restoration activities, under alternatives C and D, are expected to be of short duration and localized in nature. To avoid potential adverse effects to existing wildlife populations, activities would be completed in a manner and timeframe that would least disturb the wildlife present. Any work involving the use of heavy equipment would comply with terms and conditions established in Federal and State permits to avoid affecting endangered species. It is predicted, however, that any near-term disturbance of wildlife could be offset within 3 to 5 years by the greatly increased habitat values. To avoid recurring disturbances, reconstruction of habitats would be designed, to the extent possible, for minimizing the amount of annual O&M required. Monitoring and evaluating activities, such as stream temperature sampling and visual surveys of fish and wildlife habitat, would have no known adverse environmental effects.

The following information addresses project effects on non-ESA fish and wildlife species that was requested by the USFWS in regards to Fish and Wildlife Coordination Act (FWCA) reporting. Additional project measures, specifically targeting non-ESA fish and wildlife species, are not required. The project goals to enhance ESA species habitat and improve water quality, riparian habitat, and flood plain functioning are also consistent with meeting the needs of non-ESA fish and wildlife species.

Table 6-1 summarizes the overall effects of the projects on each site for wildlife and fish species that are not listed under the ESA. The ratings are based on the short- (*e.g.*, 1 to 5 years) and long-term effects (*e.g.*, 10 to 30 years) of the habitat manipulation, structures, and subsequent land management. The rating does not consider the short-term disturbance that would be caused by the human activity and machinery during project construction. Table 6-1 also shows, at a glance, the wildlife species groups that would benefit from the proposed project as well as the different actions that would produce the beneficial effects. Benefits may be somewhat reduced at project sites due to the potential for human activity, such as a potential subdivision at Dunfee Slough, the campground on the Hammond property at the Hot Springs site, the Sportsman's Access boat ramp at Pennal Gulch, and BLM sites' recreational use. While human recreational activity is already present at these sites, the project is not expected to increase the existing activity level. Most of the sites should produce measurable beneficial changes in the quality of habitat, the population size, and diversity of species present.

**Table 6-1 Effects on Non-ESA Listed Fish and Wildlife.**

| Species Group | **Project Site and Effects** **B** = Beneficial effects, **NL** = Neutral or little | | | | | Preferred Alternative Actions That Would Enhance Habitat |
|---|---|---|---|---|---|---|
| | Hwy 93 Bridge | Dunfee Slough | One-Mile Island | Hot Springs | Pennal Gulch | |
| *Amphibians and Reptiles* | B | B | NL* | B | B | Improving the riparian zone (plantings, fencing, side channel work, the wetland, *etc.*) would benefit amphibians more than reptiles. Benefits for reptiles would be more noticeable along the fringes of the riparian zone where the ambient temperature would be higher than under the riparian forest canopy. |
| *Waterfowl and Wading Birds* | B | B | B | B | B | Work on side channels, Hot Springs creek, and the new wetland would increase/improve habitat for these birds. Fences and managed grazing would protect banks and herbaceous vegetation that provides cover and nesting habitat. |
| *Small Mammals* | B | B | B | B | B | Opening new channel, improving flood plain connection, planting trees, fencing, and managed grazing would increase riparian vegetation for forage and cover. |
| *Migratory Birds* | B | B | B | B | B | Planting trees and shrubs would increase nest and forage sites. Fences and grazing mgmt. would aid establishment of new trees and shrubs. |
| *Hawks and Owls* | B | B | B | B | B | Planting trees would provide nest and roost sites for raptors. All activities that improve habitat for small mammals (*e.g.*, seeding, fencing, grazing mgmt., *etc.*) would increase the prey base for raptors. |

| Species Group | Project Site and Effects<br>**B** = Beneficial effects, **NL** = Neutral or little | | | | | Preferred Alternative Actions That Would Enhance Habitat |
|---|---|---|---|---|---|---|
| | Hwy 93 Bridge | Dunfee Slough | One-Mile Island | Hot Springs | Pennal Gulch | |
| ***Big Game*** | B | B | NL * | B | B | Fencing, grazing mgmt., planting trees and shrubs, reconnecting the flood plain, and reducing access (Hwy 93 bridge) would increase cover and forage. |
| *Predators (bear, coyote, bobcat, etc.)* | B | B | NL * | B | B | Plantings, fencing, grazing mgmt., new side channels, the wetland, *etc.,* would all improve habitat for prey species like small mammals, birds, and big game. Proximity to roads and human activity may reduce benefits slightly in places like Pennal Gulch Sportsman's Access, Challis Hot Springs, Dunfee Slough subdivision, and Highway 93 bridge public access. |
| *Non-ESA listed native fish* | B | B | NL* | NL | B | Creation of new habitat at Highway 93 bridge, Dunfee Slough, and Pennal Gulch would probably benefit non-salmonids. Improvements at Hot Springs and One-Mile Island are not likely to show measurable improvement for non-salmonids. Negative effects are that most of these fish compete with salmon, trout, and steelhead juveniles for food. |

* One Mile Island rated "NL" due to the narrow width of the area to be enhanced.

Amphibians and reptiles would receive some benefits from the improvements along the spring channels at the Hot Springs site, such as the fences, planting shrubs and trees, and grading the streambank under alternatives C and D. Draining the existing pond on the Hammond (Hot Springs) property would result in the loss of about 2.4 acres of poor quality habitat for amphibians. Amphibian use of the existing pond is limited to the wetted area only. There is no riparian zone around this pond. The habitat is either bare, dry soil, or weeds and droughty shrubs such as saltbush. The new spring channel through the existing pond would provide about 0.8 acres of riparian habitat and open water. The new wetland that would be constructed for diverting irrigation water would provide 2 acres of open water wetland and 4 acres of riparian, emergent wetland. The new channel and wetland would provide a net gain of 4.4 acres of high quality habitat for amphibians.

Amphibians would benefit from the additional habitat created at the Highway 93 bridge and Pennal Gulch sites by the new channels that would be constructed under alternatives C and D. There would be increased aquatic habitat available as well as the increase in riparian zone.  The main benefit on the Dunfee Slough site would be the creation of perennial flows through the new channel and the existing pond-channel system.  The perennial flows would help extend the riparian zone further from the channel by raising the water table.  This would create more habitat for amphibians as well as reptiles.  At the One Mile Island site, the bank logs, riparian planting, and fences would improve about 1 acre of habitat for amphibians and reptiles.

The amount of increased or improved habitat, under alternatives B, C, and D, for waterfowl and wading birds would be similar to the benefits described above for amphibians and reptiles.  The new wetland and riparian habitat, under alternatives C and D, at the Hot Springs site would provide excellent habitat for these birds.  The new side channels at the Highway 93 bridge and Pennal Gulch sites would create additional open water habitat.  Higher quality nesting habitat and cover would be created by riparian plantings and fencing to control livestock under all of the alternatives.

All five of the project sites in the USRC area have high potential for increasing the population size and variety of species of small mammals, such as rodents, bats, beaver, mink, and skunks.  The work that would reconnect the flood plain to the river and opening side channels would help re-establish trees and shrubs in places where they have died from lack of water.  Riparian plantings and controlling livestock grazing would provide more cover and forage for small mammals.

Migratory birds, such as swallows, blue birds, wrens, warblers and sparrows, would benefit from the new riparian habitat that would be created by planting trees and shrubs on all of the project sites.  The new side channels on the Highway 93 bridge site, Dunfee Slough, and Pennal Gulch would help establish and maintain riparian woodlands.  The fences on all of the sites would protect the new trees and shrubs from livestock grazing and facilitate the establishment of the riparian vegetation.

The benefits of habitat enhancement for hawks and owls are indirectly related to the effects of these improvements on small mammal populations.  Planting more trees on all of the sites would provide additional nesting sites and hunting perches.  Improvements such as reconnecting the flood plain, fencing to control livestock, and new side channels on the Dunfee Slough site, Highway 93 bridge and Pennal Gulch would increase riparian vegetation and subsequently increase the prey base (*i.e.*, small mammals) for hawks and owls.

Big game species, primarily mule deer, white tail deer, elk, and an occasional black bear, would generally benefit from all of the alternatives.  Additional food and cover would be developed as a result of reconnecting the flood plain to the river, opening side channels, planting native trees, shrubs, forbs and grasses, and controlling livestock grazing.  The fences may occasionally have a detrimental effect on deer if they are in a weakened state during the winter and become entangled in the wire.

Smaller mammalian predators, such as coyote, badger, and weasel would benefit from all of the alternatives by increasing small mammal populations, through fencing and riparian plantings. The predator population would fluctuate as the populations of their prey changes. Larger predators, such as cougar, may occasionally move through the Round Valley and benefit from more abundant large prey (*i.e.*, deer) smaller mammals (*i.e.,* rabbits).

Native fishes, such as mountain whitefish, red side shiner, northern pike minnow, large-scale sucker, and sculpin, (*i.e.,* species not listed under the ESA) would benefit from many of the proposed activities. The construction of new side channels at the Highway 93 bridge, Pennal Gulch, and Dunfee Slough would create habitat for non-salmonid fish species. Riparian plantings and livestock control on all of the work sites would probably improve the habitat for the other native fish in the Salmon River. There is an adverse effect related to improving the habitat for other native fish and possibly increasing their numbers. Many of the non-salmonid fish species compete with juvenile steelhead and chinook salmon for food, such as red side shiner and mountain whitefish. Another impact on steelhead and chinook juveniles is from predation by northern pike minnow.

In the short and long term, alternative B was considered to have a moderate positive impact (+1) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to promote healthy native vegetation due to cattle exclusion, but would take time to develop. In the short and long term, alternatives C and D were considered to have a high positive impact (+2), as vegetation would recover more quickly from planting efforts, creating immediate and sustained benefit from project improvements.

## 6.9 Threatened and Endangered Species

Though some mature native vegetation would be removed during project construction, this should be compensated by the aquatic restoration and replanting effort. From 50 to 70 trees would be removed. Several, which would be large cottonwoods and adjacent vegetation, would need to be removed for construction of the project. However, many other mature cottonwoods are located both up and downstream from the project site. The project would establish vegetation in the open and disturbed areas that would eventually establish a more continuous riparian buffer along the river reaches.

Construction work for alternatives C and D would be planned during the traditional in-water, winter-work window, September 1 to March 1, in order to avoid impact to anadromous fish. Work in the main stem would only continue after January 15 with the use of a turbidity curtain, cofferdam, water bladder, or other temporary protective structure. Some types of work may be performed at other times of the year if the following occur: (1) No ESA listed fish are present; (2) provisions for fish passage are in place; and (3) appropriate best management practices (BMPs) are used. Table 2-4 identifies the critical life stage time periods for various fish species.

The Biological Assessment (BA) for alternative C is provided in appendix N. The BA for species under USFWS jurisdiction determined that the project “may affect, but is not likely to adversely affect” (NLAA) bull trout, bald eagles, gray wolf, and yellow-billed cuckoo. It also determined there would be “no effect” on Canada lynx.

The determination for alternative C, for anadromous fish under NOAA Fisheries jurisdiction, is shown in table 6-2. The table is separated by site, species, and activity and summarizes the Determination of Affect Matrix used by NOAA Fisheries. The completed Determination of Affect Matrix forms are found in appendix M. In general, certain project activities were determined to likely to adversely affect (LAA) steelhead and chinook juveniles. The project was determined NLAA sockeye salmon. As a result of the LAA determination, an incidental take limit of 20 juvenile or 3 adult salmonids is established in the NOAA Fisheries Biological Opinion (BiOp) for in-stream activities and salvage operations for the life of the proposed project (see appendix J). The BiOp also identifies terms, conditions, and reasonable and prudent measures for alternative C (appendix J).

**Table 6-2 Biological Assessment Determinations for Anadromous Species.**

| Project Site | Species | Proposed Activities | Determination |
|---|---|---|---|
| Hwy 93 Bridge | Sockeye salmon | Construct rock sill, construct new side channel and open ends, point bars in side channel, French drain and refuge pool, barbs to create pools, levee for flood plain connection, 46- by 60-inch (152-cm) pipe arch, high-flow channel with hardened road section, fence, plant trees, parking and storage area, and continuing construction and maintenance. | NLAA |
| | Steelhead and chinook salmon | Construct rock sill in river and open ends of new side channel, continuing construction and maintenance. | LAA juveniles, not adults |
| | Steelhead and chinook salmon | Construct new side channel, point bars in side channel, French drain and refuge pool, barbs to create pools, levee for flood plain connection, 46- by 60-inch (117- by 152-cm) pipe arch, high-flow channel with hardened road section, fence, plant trees, parking, and storage area. | NLAA |
| Dunfee Slough | Sockeye salmon | Construct a rock sill in the river and put in a 48 inches (122 cm) CMP with a 1.5-ft-square (0.46-m-square) orifice, construct 200 to 400 ft (122 m) of new side channel, rearrange pond spillway rocks, install fish screens, plant trees build fence, deepen ponds and channels between them, parking and storage area, continuing construction, and maintenance. | NLAA |
| | Steelhead and chinook salmon | Construct a rock sill in the river and put in a 48 inches (122 cm) CMP with a 1.5-ft-square (0.46-m-square) orifice, continuing construction, and maintenance. | LAA juveniles, not adults |
| | Steelhead and chinook salmon | Construct 200 to 400 ft (61 to 122 m) of new side channel, rearrange pond spillway rocks, install fish screens, plant trees, build fence, and deepen ponds and channels between them, parking, and storage area. | NLAA |
| One Mile Island | Sockeye salmon | Grade riverbank, install bank logs, build fence, plant trees, continuing construction and maintenance, parking, and storage area. | NLAA |

| Project Site | Species | Proposed Activities | Determination |
|---|---|---|---|
| | Steelhead and chinook salmon | Grade riverbank, install bank logs, continuing construction, and maintenance. | LAA juveniles, not adults |
| | Steelhead and chinook salmon | Build fence, fence maintenance, plant trees, parking, and storage area. | NLAA |
| Hot Springs | Sockeye salmon | Open 700 to 800 ft (213 to 244 m) of old side channel, continuing construction, and maintenance. | NLAA |
| | Steelhead and chinook salmon | In the river: Open 700 to 800 ft (213 to 244 m) of old side channel. In Challis Hot Springs Creek: Build gravel dams to form pools, cobble beds, replacing three CMPs with 46- by 60-inch (117- by 152-cm) pipe arches, excavate banks, drain pond, excavate channel through pond, install flume and diversion structure for irrigation water, fish screens, build a wetland and channels to take water out of it, water gaps in a fence, deepen thalweg, continuing construction, and maintenance. | LAA juveniles, not adults |
| | Steelhead and chinook salmon | Build a fence, fence maintenance, and plant trees. | NLAA |
| Pennal Gulch | Sockeye salmon | Construct new channel around a wetland, build levee between channel and wetland, barbs in new channel, 48-inch (122-cm) CMP, excavate in an existing channel, bank logs in side channel, high-flow channel across a road, open old side channel for intermittent flows, construct temporary roads, plant trees, lower levee at Sportsman's Access, breach levee upstream from Sportsman's Access, construct rock sill in river near levee breach, install 48-inch (122-cm) CMPs with a 1.5-ft-square (0.46-m-square) orifice at both levee sites, build a fence with water gaps, continuing construction and maintenance, parking, and storage area. | NLAA |
| | Steelhead and chinook salmon | Construct new channel around a wetland, build levee between channel and wetland, barbs in new channel, 48-inch (122-cm) CMP, excavate in an existing channel, bank logs in side channel, high-flow channel across a road, open old side channel for intermittent flows, construct temporary roads, lower levee at Sportsman's Access, breach levee upstream from Sportsman's Access, construct rock sill in river near levee breach, install 48-inch (122-cm) CMP with a 1.5-ft-square (0.46-m-square) orifice at both levee sites, water gaps in a fence, and continuing construction and maintenance. | LAA juveniles, not adults |
| | Steelhead and chinook salmon | Build a fence, fence maintenance, plant trees, and a parking and storage area. | NLAA |

In the short and long term, alternative B was considered to have a moderate positive impact (+1) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to improve anadromous fish conditions, but would take time to naturally develop. In the short and long term, alternatives C and D were considered to have a high positive impact (+2), as conditions for anadromous fish would recover more quickly from construction and planting efforts, creating immediate and sustained benefit from project improvements.

### 6.10 Water Quality

The impacts of the construction activity, under alternatives C and D, would have a negligible impact on the coldwater aquatic environment. Water quality should improve from riparian corridor development, cattle exclusion, secondary channels, and increased flooding frequency in the flood plain. The riparian corridor and proposed bank treatments would help reduce sediments and high turbidity due to bank erosion. In the long term, when replanted vegetation is more fully matured, this project should improve the temperature and sediment characteristics of the river.

Impacts to water clarity and color would be directly related to the period of increased turbidity. Slight changes to these characteristics may occur along with the increased turbidity. These levels should return to normal immediately following completion of the construction activity. Light penetration may be reduced during the period of increased turbidity. No impacts are expected because of this change in the light penetration level. Dissolved oxygen levels should not be affected by the proposed actions. No measurable effects on nutrient concentrations are expected.

No leachable metals or organic toxicants are expected to be present in the excavated or fill material. In the absence of laboratory samples, there is no outward evidence of stressed vegetation, or unnatural or industrial land use, near the creek that would suggest samples should be taken. Naturally occurring metals may exist in excavated or fill materials.

If abandoned or buried hazardous waste or pesticides were discovered during construction, it would be managed in accordance with Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements, as applicable. Construction activity in that location would be stopped until an environmentally protective solution was put in place to prevent further spread or migration of the contamination.

Efforts under alternatives C and D would be taken to minimize in-water work that would affect water quality. When possible, construction activities would be conducted in non-watered areas for secondary channel segments. Turbidity levels in the river would increase for short time periods in construction areas when the channel is rerouted to the non-water excavation areas and where structures are installed and in-water excavation and replacement of fill material is performed in the channel.

In the State of Idaho, there is not a specific level for turbidity level acceptable above background (personal correspondence Greg Eagor of DEQ April 2004). The project is required to collect and record daily turbidity measurements at three locations: background, just downstream of in-stream work area, and 300 ft (91.4 m) downstream (or mixing zone location). If a turbidity problem is reported, DEQ evaluates the turbidity history data to determine if construction methods or durations need to be changed. Also, BiOp reasonable and prudent measure No. 4c requires limiting in-stream work to 4 hours per day if construction work produces unacceptable levels of sediment under the Clean Water Act (CWA).

Fluctuating turbidity levels exceeding an estimated 50 Nephelometric Turbidity Unit (NTUs) above background are anticipated near the in-water work site. The increased turbidity level should return to normal soon after excavation ceases or the channel is rerouted through a new segment. The construction period is anticipated to occur over a 3-month period during each year of phased work, and the activities causing elevated turbidity levels would be distributed throughout this period. Monitoring for turbidity would occur during active in-water work periods. Monitoring points shall be at:

- an undisturbed site (representative background) 100 ft (30 m) upstream from the fill or discharge site;
- 100 ft (30 m) downstream from the fill or discharge site; and at the fill or discharge site.

As specified by the BiOp, in-stream work would be limited to 4 hours per day if unacceptable sediment levels under the CWA were generated. Unacceptable sediment levels would violate the antidegradation policy defined in 40 Code of Federal Regulations (CFR) 131.12. The antidegradation policy and implementation methods are to be consistent with maintaining and protecting water quality levels necessary to support propagation of fish and wildlife. Additional practicable sediment control measures are identified in appendix I.

In the short and long term, alternative B was considered to have a no or low positive or negative impact (0) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to improve water conditions, but would take time to naturally develop. Alternatives C and D, in the short term, were considered to have a medium positive impact (+1), since connecting side channels without vegetated banks and canopy could slightly increase sediment and temperature characteristics of the river, while increasing the frequency of flooding in the flood plain. In the long term, alternatives C and D were considered to have a high positive impact (+2), as conditions for water quality would recover more quickly from construction and planting efforts, creating immediate and sustained benefit from project improvements.

### 6.11 Wetlands

Alternatives C and D would restore Hot Springs and Pennal Gulch wetlands to more closely resemble natural conditions as they were before being altered by man. At both sites, restoration would mean converting open water wetland to riverine wetland. Doing so would provide beneficial rearing areas for steelhead and meet the test for providing an overall benefit to the watershed. There would be no net loss of wetland, merely a conversion from one wetland type to another, for the net benefit of the watershed's ecosystem. Additionally, the project would create riparian buffer zones that also may be used for additional mitigation credit in creating watershed benefit. Refer to chapter 7 for additional project description.

As a civil works project, a permit from the Regulatory Division of the Corps is not required (*i.e.*, the Corps does not issue a permit to itself). However, every attempt would be made to be consistent with the Section 404 wetland policies. Regulatory Guidance Letter No. 02-2 dated December 24, 2002, provides for "out-of-kind" mitigation on the condition that more environmental and watershed benefit would be created than by "in-kind" replacement.

Under alternatives C and D, small, localized areas, where standing water is present for more than 1 month per year, would be converted to riverine and emergent wetland habitat where secondary channels are constructed. In these instances, however, the raised water table is expected to create new small, open water wetlands in the same or greater proportion, so that there would not be a net loss of this habitat class.

Alternatives C and D would isolate the Hot Springs reservoir from the spring-fed creek by routing the creek through the reservoir. The reservoir would be recontoured so that approximately one-third of the area is below the ground water table and would support open water and emergent vegetation. The excavated material would be filled around the edges of the pond to raise the ground elevation. The variation in elevation is expected to support a wide range of wetland types, including open water, emergent, scrub shrub, and forest.

Alternatives C and D would also create a new treatment pond for the excess irrigation water that would discharge directly to the river. The constructed wetland would have better wetland function and plant diversity than the existing pond. The separation of the creek from the reservoir would also improve the overall function of the riverine system and provide fish passage for endangered salmonid species that use the creek for spawning and rearing habitat. Table 6-3 summarizes the breakdown for wetland habitat types for with and without project conditions for alternatives C and D. The with project data is based on the 15-year future condition, while the without project condition assumes no change in the current condition.

The existing Hot Springs reservoir site is approximately 2.4 acres consisting entirely of open water wetland (unconsolidated bottom). In 15 years, the re-contoured reservoir and re-established spring channel under alternatives C and D would provide approximately:

- 0.2 acres riverine habitat with unconsolidated shore.
- 0.4 to 0.8 acres of open water wetland.

- 0.8 to 1.4 acres of high quality emergent wetland.
- 0.4 to 0.8 acres of palustrine scrub shrub.
- 0.4 to 0.8 acres of palustrine forest.

The new treatment pond, after 15 years, would provide approximately 2 acres of open water wetland and 4 acres of high quality emergent wetland.

The constructed channel at the Pennal Gulch site wetland, after 15 years, would provide, under alternatives C and D, an estimated:

- 0.8 acres of open water.
- 0.1 to 0.8 acres of riverine habitat with unconsolidated shore.
- 0.5 to 1.5 acre of high quality emergent wetland.
- 0 to 0.2 acres of palustrine scrub shrub.
- 0 to 0.2 acres of palustrine forest.

Table 6-3 illustrates the combined habitat acreages for with and without project conditions. The table also includes the projected amount of created habitat acreage for the entire project. The temporary impacts to the Pennal Gulch wetland and associated conversion would be mitigated by the project as a whole on a site-by-site basis, in case all of the sites are not constructed.

**Table 6-3 Habitat Classes and Acreages by Project for Alternatives C and D.**

| **Description and Location** | **Site No.** | **Open water** | **Riverine** | **Emergent wetland** | **Palustrine scrub shrub*** | **Palustrine forest *** | **Total** |
|---|---|---|---|---|---|---|---|
| Existing storage reservoir (without project condition) | 3 | 2.4 | - | - | - | - | 2.4 |
| New wetlands (reconstructed treatment pond) | 3 | 0.4-0.8 | 0.2 | 0.8-1.4 | 0.4-0.8 | 0.4-0.8 | 2.4 |
| New treatment pond (constructed wetland) | 3 | 2 | - | 4 | - | - | 6 |
| **With project total for Hot Springs site** | 3 | 2.4-2.8 | 0.2? | 4.8-5.4 | 0.4-0.8 | 0.4-0.8 | 8.4 |
| Existing Pennal Gulch wetland (w/out project condition) | 1 | 0.5 | - | 1.3 | - | - | 1.8 |
| Proposed Pennal Gulch riverine wetland (secondary channel reconnected) | 1 | 0.1-0.8 | 0.1-0.8 | 0.5-1.5 | 0-0.2 | 0-0.2 | 1.8 |
| **With Project Net Increase** | | -0.4 to 0.7 | 0.1-0.8? | 4.0-5.6 | 0.4-1.0 | 0.4-1.0 | 6 |
| **Entire Project (5 sites)** | all | ? | ? | ? | ? | ? | ? |

* future conditions assume 15 years of habitat development.

Alternative B was considered to have a moderate positive impact (+1) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to promote wetland habitat, but would take time to develop. In the short and long term, alternatives C and D were considered to have a high positive impact (+2), as wetland habitat would see immediate and sustained benefit from project improvements.

### 6.12 Cultural Resources

Investigations (*i.e.*, file search and survey) were conducted to identify the number and type of cultural resources present within the APE in order to avoid and minimize the potential for disturbance. In addition to addressing known cultural resources, the Corps' construction contract would require the contractor to immediately stop all work in the area of an inadvertent discovery, have a qualified archeologist assess the find, and not resume work until all necessary coordination is completed and a directive to proceed with work is issued by the Corps. All of the alternatives were considered to have a no or low positive or negative impact (0) in the short and long term.

### 6.13 Aesthetics/Visual Quality

Construction noise and activities would minimally affect local residents and passersby. Construction would take place only during daylight hours. The qualities that make the area appealing would be expected to be improved as a result of the project, and since the river is generally set back away from Highway 93, construction work would not be unsightly. The excavated areas would be planted with native grasses to conceal the construction work. The excavation work would blend into the surrounding landscape and would employ typical stream restoration methods that rely primarily on natural materials. The riparian vegetative plantings, when mature, would enhance the visual quality of the project area.

Alternative B was considered to have a no or low positive or negative impact (0) in the short term and a high positive impact (+2) in the long term, since the natural process would evolve to promote visual quality but would take time to develop. Alternative C was considered to have a moderate negative impact (-1) in the short term, due to construction impact to vegetation and immature plantings, but a high positive impact (+2) in the long term, reflecting a mature riparian appearance and sustained benefit from project improvements. Alternatives D was considered to have a moderate negative impact (-2) in the short and long term due to construction impact to vegetation, immature plantings, and the exclusive use of rock for bank armoring, retaining its unnatural appearance with its surroundings.

### 6.14 Recreation

Recreationists would not be expected to experience any significant sport impediment because of the proposed actions. At the Highway 93 bridge site, OHV access would be restricted but not eliminated. Riparian areas would be protected by fences, which would exclude OHV usage. The area is designated as "Open" by BLM (BLM 1998). The open

OHV designation is defined as "vehicle travel is permitted both on and off roads, if the vehicle is operated responsibly in a manner not causing, or unlikely to cause significant, undue damage or disturbance of the soil, wildlife, wildlife habitat, improvements, cultural or vegetative resources." Given the close proximity to riparian habitat that would be established, fencing would be installed to preclude OHV damage to wildlife habitat or improvements under all of the alternatives. All of the alternatives have a rating of no or low positive or negative impact (0) in the short term and in the long term.

## 6.15 Transportation and Noise

Traffic delays and inconvenience to the public is expected to have a minimal impact. Short-term minor traffic or noise impacts may be experienced by the residents of the homes near the work sites due to construction effort or vehicle traffic that would travel on the nearby roads. Construction would typically occur during daylight hours. Constraints on water quality could limit in-stream construction operations to 4 hours per day. Given the remote river locations for the sites, noise generated by construction would likely only affect landowners adjacent to the project.

In the short term, alternatives C and D were considered to have a moderate negative impact (-1), as construction trucks and vehicles could impair local traffic and noise conditions.

## 6.16 Land Use

The project design would not increase the risk of flooding to residential structures during a 1 percent chance exceedance (100 year) event, when compared to the no-action alternative. The alternatives would construct fencing to exclude grazing and may employ land use management to control grazing practices. Conservation easements may be used to prevent agriculture and exclude cattle grazing within 50 ft (15 m) of natural springs and secondary channels, in order to allow the riparian habitat to become re-established. Once the riparian buffer is re-established, a GMP may be used to re-introduce cattle grazing at a density and frequency that would not harm the established riparian buffer. A conservation easement would also prevent residential development within the conservation easement boundary.

Alternatives B, C, and D were all considered to have a high positive impact (+2) in the short and long term, since the conservation easements would protect the riparian areas from future housing or agricultural development.

## 6.17 Socio-Economics

The proposed alternatives can be expected to have effects on the regional economy different from those considered in the National Economic Development (NED) framework used in the cost benefit analysis. The investment required to implement each alternative suggests some level of employment and household income during the implementation period. Some goods and services needed for implementation may be purchased from businesses within the local economy, thereby, providing income to business owners.  There would also be indirect effects stemming from these direct effects.

Several types of information are essential in understanding how the regional economy may be affected by the alternatives.  First, it is essential to identify the area in which most of the direct impacts would occur.  The area can then be described in terms of the demographic and economic variables that define recent socioeconomic trends in the area.  This description provides a baseline for evaluating effects of the alternatives.

In identifying an appropriate impact area, the basic question is “where will the effects be felt?”  Realistically specifying this area requires that it be large enough to have a sufficient variety of economic activity to be relatively self contained, yet small enough that the impact is felt in the targeted economy.  It is anticipated that Custer County, Idaho, would be affected the greatest.  Effects would be felt in neighboring cities of Challis and Mackay in Custer County since these two communities comprise one-third of the total county population (1,475 divided by 4,342).  Custer County is classified as 100 percent rural.

Over the long run, the proposed project would help stabilize and improve an already viable natural resource based economy.  In the short run, the revenues from constructing and maintaining the project would inject new dollars into the local economy, creating new sources of personal income and jobs.  The influx of approximately $5 million for initial project construction over a 3-year period would create most of the new jobs and revenue flow within the county.  This is a short-term “stimulus.”  The main economic improvement over the long term would evolve by maintaining a healthy aquatic and riparian ecosystem.  The BLM has planned a new all terrain vehicle roadway for the area, which would also spur economic activity in the county.  The Idaho State Parks, USFS, and BLM expect to invest between $500,000 to $600,000 in this project.  Recreation is expected to be the leading catalyst to boost the local economy in the future.  Total general recreation visitor days were estimated at 75,000 days for 2002 (BLM, USFS, and Idaho State Parks, 2002).  The influx of approximately $5 million for initial project construction over a 3-year period would create new jobs and revenue flow within the county.  Modeling this change using the Impact Planning Analysis (IMPLAN) 1994 model shows this short-term “stimulus” of a new $5 million, total investment in environmental restoration in Custer County, would result in 295 new jobs over the 3-year construction period.

In the short term, alternatives C and D were considered to have a moderate positive impact (+1), due to the stimulus of construction spending affecting the local economy. Alternatives B, C, and D in the long term were considered to have a moderate positive impact (+1), since the improved habitat condition would have long term benefits to the community’s recreational attraction.

## 6.18 Summary and Evaluation of Short- and Long-Term Impacts

Short-term impacts are defined as impacts to resources and other categories that are expected to exist during and immediately following construction activity. Some short-term impacts may persist for 2-3 years until vegetation becomes well established. Long-term impacts are defined as impacts, positive and negative, that are estimated to persist once the vegetative community approaches a mature state, which would be a minimum of 10 years after construction, through the life of the project.

A rating for the short- and long-term impacts for each alternative is identified in table 6-4. The table contains a matrix of alternatives versus the resources and other categories identified in chapter 6. The scores are determined with respect to the no-action alternative. A brief description of each alternative is contained in section 3.2.

By analyzing table 6-4, the following impact evaluation conclusions can be made:

- Alternative C, Naturalized Constructed Solution, provides the highest overall benefits and most closely meets the goals and objectives of the project.
- All of the alternatives provide a high positive land use impact.
- Alternative B positive impacts are typically moderate in the short term and high in the long term, while alternatives C and D positive impacts are typically realized in the short term, because they are accelerated by construction efforts.

Analysis of the short- and long-term impacts for the project alternatives shows that alternative C furnishes the highest and most positive effects overall in consideration of all of the resource categories. Because this alternative is best suited for meeting the project goals and objectives and furnishes the greatest net positive impacts, alternative C is selected as the preferred alternative.

**Table 6-4 Short- and Long-Term Impacts for Project Alternatives.**

| | Ratings of Alternatives | | | | | |
|---|---|---|---|---|---|---|
| **Resource** | **B. Natural Evolution** | | **C. Naturalized Constructed Solution** | | **D. Non-Natural Constructed Solution** | |
| | **S** | **L** | **S** | **L** | **S** | **L** |
| 1. Climate | 0 | +1 | 0 | +1 | 0 | +1 |
| 2. Topography | 0 | +1 | +1 | +1 | +1 | +1 |
| 3. Soils | 0 | +1 | +1 | +1 | +1 | +1 |
| 4. Hydrology / Flood Plain Connectivity | 0 | +1 | +2 | +2 | +1 | +1 |
| 5. Irrigation | -1 | -1 | +2 | +2 | +2 | +2 |
| 6. Aquatic Resources | +1 | +2 | +2 | +2 | +2 | +2 |
| 7. Vegetation | +1 | +2 | +2 | +2 | +2 | +2 |
| 8. Wildlife | +1 | +2 | +2 | +2 | +2 | +2 |
| 9. Threatened and Endangered Species | +1 | +2 | +2 | +2 | +1 | +1 |
| 10. Water Quality | 0 | +2 | +1 | +2 | +2 | +2 |
| 11. Wetlands | 0 | +1 | +2 | +2 | +2 | +2 |
| 12. Cultural Resources | 0 | 0 | 0 | 0 | 0 | 0 |
| 13. Aesthetics / Visual Quality | 0 | +2 | -1 | +2 | -2 | -2 |
| 14. Recreation | 0 | 0 | 0 | 0 | 0 | 0 |
| 15. Transportation / Noise | 0 | 0 | -1 | 0 | -1 | 0 |
| 16. Land Use | +2 | +2 | +2 | +2 | +2 | +2 |
| 17. Socio-Econ | 0 | +1 | +1 | +1 | +1 | +1 |

| **Legend** | |
|---|---|
| +2 | High positive impact |
| +1 | Moderate positive impact |
| 0 | Low or no positive or negative impact |
| -1 | Moderate negative impact |
| -2 | High negative impact |
| **S** | **Short-term Impacts** |
| **L** | **Long-term Impacts** |

## 7.0 DESCRIPTION OF PREFERRED ALTERNATIVE AT PROJECT SITES

The following description of environmental restoration work is organized to coincide with locations denoted on plates 9 though 14, which shows the project boundaries for the proposed restoration project. Aerial photography from May 22, 2000, was used as a background for the design plates, in order to provide points of reference and general features to assist in developing the restoration design. Additional detail of restoration measures is found in section 2.4 and appendix C. Additional description of the existing project site conditions is found in section 5.1.2.

### 7.1 Pennal Gulch Site 4

An aerial photo of the Pennal Gulch site and proposed project actions is shown in plate 9. The majority of the property is managed by the BLM. The project would breach an existing levee and install a CMP to control inflow. Between 1,300 and 1,700 ft (396 to 518 m) of new channel would be excavated or filled to form a new channel to connect with the old side channel. The channel would infringe on the edge of the existing wetlands.

Several techniques would be used to connect the new channel with the old side channel. A 4-ft-diameter (1.2-m-diameter) by 20-ft-long (6-m-long) CMP with an 18- by 18-inch (46- by 46-cm) orifice plate would be installed about 700 ft (213 m) upstream from the Sportsman's Access to connect to a secondary channel. A stone sill structure would be built at the entrance of the secondary channel to control inflow and reduce deposition of material at the entrance. The structure would be lined with rock, approximately 50 to 80 ft (15 to 24 m) long, and constructed to a height that would overtop during the approximate 33 to 100 percent chance exceedance (1 to 3 year) event. An earthen levee, approximately 1,000 ft (305 m) long, with a height containing approximately a 67 percent chance exceedance (1.5 year) event would be constructed to maintain sediment transport and water temperature. The levee would provide separation from the adjacent wetlands that may be a solar heat sink. The channel would infringe on a wetland that formed when the channel was disconnected and revert the area to its prior riverine condition. The levee would be replanted and the open area wetland would be reduced in size and possibly revert to a more scrub-shrub wetland. Between 1,300 and 1,700 ft (396 to 518 m) of new channel would be excavated or filled to form a new channel to connect with the old side channel.

The excavated channel width would be relatively narrow to minimize the surface area and potential for solar warming. Where room is available without undue removal of trees, a bench would be provided at an elevation slightly above the 67 percent chance exceedance event. This bench already exists in some instances and provides a surface that is close to the water table for robust riparian growth. The width of the bench would vary greatly depending on proximity to existing trees. Large woody debris would be anchored into the side of approximately 400 ft (122 m) of channel to provide cover where suitable on-site material is available for salvage. The constraints on horizontal alignment (proximity to property boundary and the wetlands) and on vertical alignment (existing elevation of Salmon River thalweg at the entrance location) reduce the opportunities to provide habitat features, especially meander bends, pools, and riffles. To compensate for the lack of riffles and pools, the design would include two barbs that would direct flow against the opposite bank, which would be protected by a sill formed of large boulders for bank protection. This combination of barb and sill is expected to create a deep scour pool and deposit the scoured material downstream to form a riffle.

Also, an access road providing sportsman access crosses the channel alignment at approximately 1,100 ft (335 m) downstream of the entrance. A 46- by 60-inch (117- by 152-cm) pipe arch, approximately 20 ft (6.1 m) long, would provide vehicle access across the channel. The pipe arch would not provide sufficient flow capacity for flood events greater than the approximately 33 to 100 percent chance (1-3 year). Therefore, a high-flow channel that carries much of the peak flow and provides fish passage during the flood would be provided. This high-flow channel would cross the Sportsman's Access road. Consequently, at the high flow crossing location, approximately 75 to 100 ft (23 to 30.5 m) of the roadway would be constructed of a hardened overflow road section to accommodate overtopping and minimize damage to the road by the floodwaters.

For approximately 800 ft (244 m) downstream of the CMP, some channel excavation would be required to transition from the CMP thalweg to the natural channel thalweg. A third barb and sill would be installed approximately 500 ft (152 m) downstream of the CMP to provide a pool though this reach.

A 4-ft-diameter (1.2-m-diameter), by approximately, 40-ft-long (12.2-m-long) CMP with an 18- by 18-inch (46- by 46-cm) orifice plate would be installed through the Sportsman's Access levee. The levee would be reduced in height by approximately 3 ft (0.91 m) for a distance of approximately 100 ft (30.5 m). This would provide increased flood plain connection behind the levee by overtopping the lowered surface, and thus increase the flooding frequency to about every 2 to 5 years. The channel downstream of the new CMP has two areas of bank erosion from past flood events. Logs anchored with rock and banks planted with willow plantings would be constructed to stabilize the banks in these locations.

A fence would be constructed for a length of approximately 5,500 ft (1676.4 m) to provide a grazing exclusion area of approximately 88 acres. Two water gaps with hardened fords would be constructed to provide for stock watering. A fish screen would be provided above the point that the irrigation connects to the secondary channel. Bank protection using logs and willow plantings would be placed in locations where bank erosion is occurring. Barbs and sills would be installed to create pools.

The proposed secondary channel connection intersects a network of relic channels that provide year-round flow with combined spring water and excess irrigation water during the irrigation season. The excess irrigation inflow points are remote from the secondary channel location and are not easily distinguished from the springs. Isolating this network from the secondary channel with a fish screen or fish barrier at the connection point with the secondary channel would remove a relatively large, potentially valuable habitat area from use. By not including a fish screen or barrier, the habitat benefit from the additional unscreened stream is believed to outweigh the risk of fish being trapped further upstream where the irrigation system enters.

The riverflow directly impinges on the levee with relatively high velocity, and it is unlikely that silt curtains would be effective in controlling sediment release. Consequently, the most likely construction methodology would be to limit the in-water work to the 4-hour-per-day exceedance window to minimize sediment release during in-water construction of the rock-lined sill inlet, log and willow bank protection, CMP installation, barbs and sills, and reconnection to the main stem.

Construction access to the BLM property would be from the existing Sportsman's Access road off Highway 93. Temporary travel pathways, approximately 3,000 ft (914.4 m) long, may need to be constructed within the site to connect various construction points. Construction equipment would be parked along the existing road in widened areas that currently serve vehicle parking and are more than 300 ft (91.4 m) from the stream. Also, CMPs and other miscellaneous construction materials would be staged in existing parking areas and existing widened areas along the road. Rock material removed to lower the existing levee would be placed on the backside of the levee to reduce the grade from the top of the levee and avoid forming a plunge pool behind the levee when it is overtopped. Additional material would be taken to an existing gravel pit, located just southwest of the project site, near the sewage disposal ponds. The spoils area is shown on plate 15 in T14N R19E Section 22. Hauling plants, fencing material, overflow road hardening, sill, barbs, logs, and construction material would require approximately 45 to 85 truck trips during the construction at the site. Approximately 10 to 20 trees larger than 2 inches (5 cm) in diameter may be removed to construct the site.

## 7.2 Hot Springs Site 3

An aerial photo of the Hot Springs site and proposed project actions is shown in plates 10 and 11. On plate 10, in the east spring segment, the project would construct approximately 300 ft (91.4 m) of gravel dam and riffle in two locations to create 3-ft-deep (0.91-m-deep) pools. An existing CMP would be replaced with a 46- by 60-inch (117- by 152-cm) pipe arch, approximately 10 to 20 ft (3 to 6 m) in length in order to improve fish passage. A water gap with hardened ford, approximately 8 to 16 ft (2.4 to 4.9 m) in width and 20 to 30 ft (6.1 to 9.1 m) in length, would be constructed in order to provide access to property between the east and west tributaries. Approximately 400 ft (122 m) of cobble beds would be installed in two locations to provide protection for small fish from herons. A fish barrier would be installed at the mouth where excess irrigation water enters the spring. Approximately 300 ft (91.4 m) of vertical banks on both sides of the spring near the CMP location would be excavated to provide 10-ft-wide (3-m-wide) flood-prone benches.

On the west spring, the project would construct approximately 300 ft (91.4 m) of gravel dam and riffle in three locations to create 3-ft-deep (0.91-m-deep) pools. The thalweg would be excavated and deepened downstream of the CMP for approximately 200 ft (61 m) to improve fish passage. Approximately 600 ft (183 m) of cobble beds would be installed in two locations to provide protection for small fish from herons. An existing CMP would be removed and replaced with a 46- by 60-inch (117- by 152-cm) pipe arch, approximately 20 to 30 ft (6.1 to 9.1 m) in length, in order to improve fish passage. Two hardened ford/water gaps, approximately 8 to 16 ft (2.4 to 4.9 m) in width and 20 to 30 ft (6.1 to 9.1 m) in length, would be constructed to provide access to property between the river and the stream.

An alternate means for watering the horse stables would be provided, on the main channel of the spring, where the east and west spring joins. Currently, the horses have direct access to the stream. A fourth hardened ford/water gap would be installed, approximately 8 to 16 ft (2.4 to 4.9 m) in width and 20 to 30 ft (6.1 to 9.1 m) in length, to reduce sediment sources for the main stem of the spring, and an existing CMP would be removed to improve fish passage.

Grazing would be managed by using several measures. Fencing would be constructed to exclude cattle and establish a riparian buffer zone. A post and wire fence would be constructed approximately 25 to 75 ft (7.6 to 22.9 m) from the bank of the springs for a length of approximately 15,000 ft (4572 m) to provide a grazing exclusion area of approximately 20 to 35 acres. Four fords/water gaps would be constructed to allow access through the grazing exclusion areas. The grazing exclusion area would be planted with native plants in order to develop a riparian buffer zone. Approximately 4,000 linear feet along the length of the river main stem would also be planted with native plants in order to develop a riparian buffer zone. The area between the fence and the river is approximately 30 to 50 acres and would be a managed grazing area. The managed grazing easement is expected to improve water quality by controlling the timing and grazing duration, in order to allow vegetation recovery, which would provide an improved buffer zone function for the watercourse.

Several of the proposed restoration measures may create turbidity. Cobble beds would be constructed in six locations shown on plate 10. The cobble material placed in the cobble beds would be relatively clean material, and turbidity generated during installation is anticipated to be relatively minor and of short duration. The installation of the CMP and fish barrier along with thalweg deepening would be planned so that it would be expeditious and associated turbidity would be of short duration. The gravel material placed would have less than 10 percent passing the No. 200 sieve to minimize the turbidity generated during placement.

Construction access to the Stark property would be from the nearby owner’s residential road, which is located off Challis Hot Springs Road. Construction locations would be accessed using existing barren pathways and open areas. The construction lay down area and office would be located within existing areas used by the owner for equipment storage. Material removed to create the flood-prone banks would be redistributed onsite. Hauling plants, fencing material, and cobble material would require approximately 25 to 50 truck trips during the construction at the site. Approximately zero to three trees larger than 2 inches (5 cm) in diameter would be removed during site construction.

On plate 11, an existing CMP on the Stark property would be replaced with a 46- by 60-inch (117- by 152-cm) pipe arch, approximately 20 to 30 ft (6.1 to 9.1 m) in length, in order to improve fish passage. Presently, irrigation water enters the Challis Hot Springs Creek near the boundary between the Stark and Hammond properties. This sediment-laden irrigation flow would be diverted into a flume and across the Challis Hot Springs Creek to prevent mixing with the natural cold-water spring. The irrigation water would flow through a constructed ditch, lined with riprap, through a 5-ft-diameter (1.5-m-diameter) CMP, through more ditch, to a diversion structure, and then into a created wetlands treatment pond that would reside on the Stark property. Stacked boulders would be placed on the face of the upstream and downstream slope of the CMP fill. At the location where the irrigation flume crosses the Challis Hot Springs Creek, a new embankment fill would be constructed across the pipe arch to support the flume and provide a new access road, by way of Hammond property, to the proposed treatment pond.

The proposed treatment pond would be approximately 6 acres in total size, which would provide about a 5-day retention time for average flows. About 2 acres would be open water wetlands and the remaining 4 acres would be emergent wetlands. The wetland would be divided into several cells for sediment maintenance with each having raised areas for emergent vegetation, deep-water areas for deep-water types of plants, and intake and outflow structures. Water from the wetlands would discharge through two newly constructed channels: (1) One that would flow approximately 400 ft (122 m) long into the river main stem, and (2) the other into a ditch for irrigation of property to the north. Five fish screens would be installed at the outflow gates from the wetland to prevent fish from entering the treatment pond and being stranded. The channel to the river would be uniformly sloped to toward the river to prevent fish stranding in the absence of flow from the wetland.

At times of the year when the sediment load and turbidity of the irrigation flow is insignificant, the irrigation flow may be diverted using the diversion structure to augment spring water flow rate. The decision to put flows into the wetlands or into the spring would be based on level of sediment, turbidity, and water temperature. If the temperature or sediment load of the irrigation water would appear to adversely affect the spring, then flows would be diverted to the wetlands. The project sponsor, or another entity assigned by subagreement, would be responsible for managing and directing the excess irrigation return. The operation parameter would likely evolve over time, based on observed conditions and consideration for the balance between the competing goals of preventing turbid water from entering the natural spring and providing the maximum flow to the natural spring. Additionally, temperature modeling data results may decide what is needed to limit the amount of irrigation water entering the natural spring in order to avoid creating a thermal barrier downstream from the cooler spring upstream.

An old channel approximately 800 ft (244 m) long, located near where the treatment pond discharges into the main stem, would be excavated to a depth that would carry perennial flow and create a secondary channel. The channel would be sloped from the treatment pond to the river in order to reduce the risk of stranding fish when the exit flow of the wetland is turned off. A water pump intake used for domestic irrigation, located near the residential buildings, would be modified to add a fish screen.

A new channel would be constructed for approximately 1,100 ft (335.3 m) through the existing pond and connecting to the existing channel at the point where the CMP crosses Challis Hot Springs Road. The construction of the new channel would include the removal of the existing culvert, road crossing, and an existing check dam. The proposed channel would have a more natural alignment and cross section, and include riffles and deep pools. Large woody debris would be installed at selected locations. The overall width of the new channel would be much less than the existing pond and, eventually, a riparian canopy should be able to span the new channel and result in minimal solar heating of the new reach. The new channel would provide high quality wetland plants along the margin of the channel bank for a width of approximately 1 to 5 ft (0.3 to 1.5 m) on each side of the channel (approximately 0.2 acres). Approximately 1,500 ft (457 m) of fence would be installed to provide an exclusion area of approximately 7.3 acres.

The new channel would cut through the existing pond, lowering the water table up to 3 ft (0.91 m), and result in the loss of the pond's existing wetland vegetation. The existing pool would be reshaped to provide banks that form a relatively narrow channel (to reduce solar input) and emergent vegetation at the shallow edges of that channel. Approximately one-third of the former pond area (0.8 acres) would be emergent and open water wetland isolated by the banks of the spring channel. This emergent and open water area would be 0 to 3 ft (0 to 0.91 m) below the surface of the ground water when constructed. It is not expected that the ground water table would experience large fluctuations because of the relatively constant flow influence of the spring. A "bench" would be formed around the open water area that is 6 inches (15.2 cm) to 1.5 ft (0.46 m) above the water surface when constructed. The bench width would vary from 5 to 40 ft (1.5 to 12.2 m) and is expected to support grasses and sedges (emergent vegetation) and perhaps some willow at the higher locations. The remainder of the pond area would be contoured to create riparian diversity areas that would support scrub-shrub vegetation, such as willow and alder in the lower areas and forested wetland plants, such as cottonwood in the higher areas.

The loss of the pondweed in the open water portion of the existing pond would, in part, be replaced with a more diverse constructed sediment removal wetland. Additionally, new wetlands would be developed at the margins of the springs on the Stark property where the water would be pooled. In these pooled areas, it is expected that the margins along the current channel would be flooded creating shallow, high quality wetlands (1 to

2 ft (0.6 m) deep, 3 to 5 ft (0.9 to 1.5 m) wide on each side, and approximately 7,500 square ft (696.8 square m). The loss of approximately 2.4 acres of low and impaired quality wetlands compared to the creation of approximately 1.2 acres of high quality wetlands is considered a net improvement.

During construction of the new channel and construction of the pools on the west channel, the flows would be diverted around the construction site using pumps or diverted into the constructed treatment pond.

Construction access to the Hammond property would be from the nearby owner's residential road, which is located off Challis Hot Springs Road. Existing trails and roads would be used for access without construction of new roads. The construction laydown area and office would be located within areas currently used by the owner for staging and equipment parking. Material removed to flatten the eroded banks would be redistributed onsite. Hauling plants, fencing, and treatment pond intake and outlet structures material would require approximately three to seven truck trips during the construction at the site. Approximately 4 to 10 trees larger than 2 inches (5 cm) in diameter would be removed in the course of the construction work.

### 7.3 One Mile Island Site 2

An aerial photo of the One Mile Island site and proposed project actions is shown in plate 12. At the upstream end of the project site, a post and wire fence would be constructed for a length of approximately 3,000 ft (914.4 m) to provide a grazing exclusion area of approximately 30 acres. Both banks of the existing secondary channel, approximately 1,900 ft (579 m) long, would be planted to establish the riparian buffer zone. The landowner currently fords the east channel to access the island. The construction for the project would use these existing fords.

There are three locations on the west side of the island, from 1,200 to 1,700 linear feet total, where the bank slope would be graded between 1 vertical on 1.5 to 3 horizontal and willow layering would be planted to provide bank protection between existing bank barbs. There are two locations on the east side of the island and one on the west side, from 1,000 to 1,500 linear feet total, where footer logs and layers of willow would be placed to provide bank protection.

The riverflow directly impinges on the levee with relatively high velocity, and it is unlikely that silt curtains would be effective. Consequently, the most likely construction methodology would be to limit the in-water work to the 4-hour-per-day exceedance window to minimize sediment release during in-water construction of the footer rock and willow layering.

Construction access to the One Mile Island property on the west side of the main channel would be from a series of private roads that connect into the grid streets in Challis. The access to the island would be from the west bank and would be from the nearby owner's residential road, which connects to local county roads, to Hot Springs

Road and eventually, to Highway 93 Alternative. Existing barren pathways would be used for access within the site. Fording the river, at several locations currently used by the landowner, would provide access to the island. The construction laydown area and office would be located in areas previously used by the landowner for staging and equipment parking. Grading the bank slope would not create any excess material. Hauling plants, fencing material, and footer rock material would require approximately 10 to 20 truck trips during the construction at the site. Approximately two to five trees larger than 2 inches (5 cm) in diameter would be removed in the course of the construction work.

### 7.4 Dunfee Slough Site 1

An aerial photo of the Dunfee Slough site and proposed project actions is shown in plate 13. The project would install a 4-ft (1.2-m) CMP with an 18- by 18-inch (46- by 46-cm) orifice plate, approximately 40 ft (12 m) long, in order to provide main stem reconnection with an old side channel. A structure would be built at the entrance of the secondary channel to control inflow and reduce deposition of material at the entrance. The stone sill structure would be lined with rock, approximately 50 to 80 ft (15 to 24 m) long, and constructed to a height that would overtop during the approximate 33 to 100 percent chance (1 to 3 year) exceedance event. Approximately 100 to 250 ft (30 to 76 m) of new channel would be excavated to connect the main channel with a relic channel.

It is expected that the construction of the new secondary channel connection and any required deepening of the pools would generate between 1,500 and 2,500 cy (1146.8 and 1911 $m^3$). The excess material would be disposed of onsite and outside of the 100-year flood plain. The landowner has requested the material be placed at and blended into the toe of the adjacent terraced slope.

A 35-ft-wide (10.7-m-wide) riparian corridor would be planted along the stream course to create approximately 40 to 60 acres of vegetated flood plain around the pools. Field adjustments would be made to the elevations of the existing spillways to allow low flows through the system of existing pools. Fish passage improvements would include rearrangement of the existing spillway rock surfaces to ensure a continuous stream of flow of acceptable velocity and without waterfalls greater than 0.5 ft (0.15 m) in height. A three-sided pre-cast bridge structure would be installed in order to cross the reconnected stream and provide access to the property between the river and the stream.

Some deepening of the pools would occur, where the spillways are lowered, to ensure that the pools behind the spillways remain a minimum of 3 ft (0.9 m) deep. Depending on available material salvaged from downed trees within the site boundary, large woody debris would be placed in the pools for cover. Two fish screens would be installed in order to prevent fish from entering the irrigation system further up the channel.

Approximately 3,000 ft (914.4 m) of jack fence (figure 7-1) would be constructed at the north and south Dunfee property boundaries to exclude cattle and to protect the northern side channel by creating a managed grazing area of between 15 and 20 acres. The managed grazing easement is expected to improve water quality by controlling the timing and grazing duration, in order to allow vegetation recovery, which would provide an improved buffer zone function for the watercourse. The easement would likely entail the elimination of any grazing for the first 3 to 4 years to allow for riparian habitat recovery.

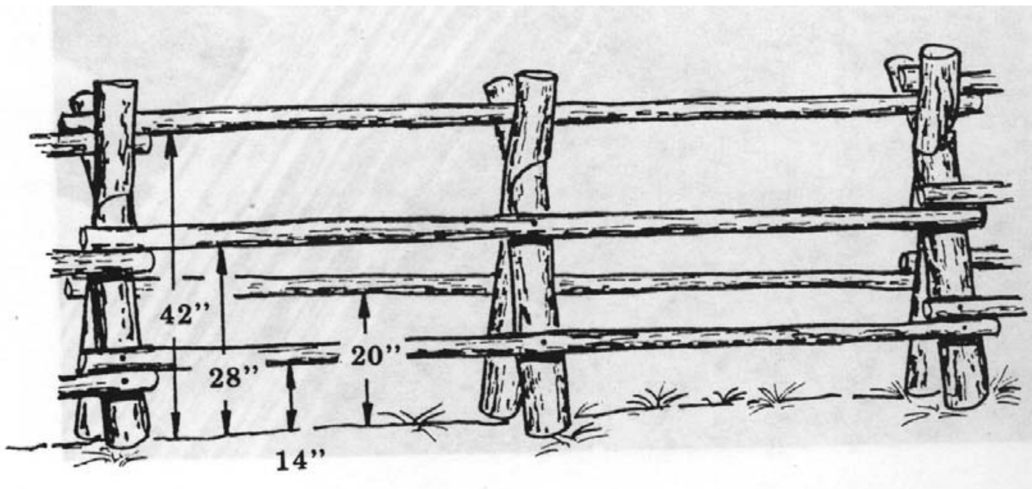



**Figure 7-1 Jack Fence.**

Irrigation inflows would be diverted or managed to reduce flows into the in-water construction areas. Flows from springs would be diverted and or pumped to other channels or to the main channel. An on-site spoil area is identified on plate 8 for excess material. Two limited height understory areas are also shown on plate 8, where plantings in these areas would be selected to limit the height of the understory.

Construction access to the site would be from the nearby owner's residential road, which is located near Highway 93 Alternate and Highway 93. Existing trails, created by the landowners, crisscross the project area. Construction vehicles would generally follow these existing trails. In locations where the channel does not follow existing roads, traffic would be held to a minimum to minimize disturbance of the surface soil and vegetation. Equipment parking, stockpiles, and other staging areas would be located within disturbed areas currently used by the landowner for similar purposes. Grading the bank slope would not create any excess material. Hauling plants, fencing material, and footer rock material would require approximately 3 to 10 truck trips during the construction at the site. Approximately 4 to 10 trees larger than 2 inches (5 cm) in diameter would be removed in the course of the construction work.

### 7.5 Highway 93 Bridge Site 5

An aerial photo of the Highway 93 bridge site and proposed project actions is shown in plate 14. As part of the project, an old side channel would be connected with the main stem. A stone sill entrance would be constructed at the upstream end of the relic channel to prevent the main stem from recapturing the channel.

At the upstream end of the relic channel, approximately 1,100 ft (335 m) of channel would consist of new excavation connecting old, existing channel sections to form a new contiguous channel. The amount of existing channel in this reach that can be used is relatively small, approximately 5 to 20 percent of the proposed length, because the existing channel is discontinuous and some of the existing segments appear in locations that may not now be suitable for a desirable alignment.

The downstream portion of the proposed channel is approximately 700 ft (213 m) in length. The alignment shown in the plate 14 is approximate and would be determined in the field based upon the most suitable of several existing, relic channels. The existing channel(s) in this portion of the proposed channel are relatively continuous and would require less new channel construction. Approximately 10 to 20 percent of the downstream portion of the proposed channel would require new channel construction. Significant clearing of heavy debris that blocks the existing channel would be required. Barbs and sills would be installed as shown on plate 14 to form scour pools. Point bars would be shaped and outer banks steepened and planted with willow layering to provide erosion protection.

A four-rail jack fence with metal posts would be constructed 500 to 600 ft (152.4 to 182.2 m) in length along each side of the boat ramp access road. There would be two breaks in the fence to provide for pedestrian access. The fence would prevent vehicle access to approximately 10 acres of BLM property, which has been degraded by borrow excavation, and the use of OHV in locations not authorized as vehicle ways. The jack rail fence would also extend the length of the secondary channel [approximately 3,000 ft (914.4 to m)] to prevent OHV access to the secondary channel and protect the riparian buffer zone. Approximately 5 acres of BLM property would remain accessible from the highway for OHV use. A short boulder fence would be installed on each side of the road where the jack fence meets the riverbank.

A 46- by 60-inch (117- by 152-cm) pipe arch, approximately 30 ft (9 m) long, would be installed across the access road to allow vehicle access to the boat launch ramp during normal channel flow. A 75- to 100-ft-long (22.9- to 30.5-m-long) hardened overflow road section would be added to the access road to provide for overbank flow when flood flows exceed the capacity of the CMP. Consequently, access to the boat launch ramp would be cut off during flood events. From 3 to 10 rock barbs would be installed where the highway embankment is close enough to the channel to be threatened by future flood events and potential migration of the channel.

Riparian planting would be performed along approximately 500 to 600 ft (152.4 to 182.2 m) of streambank. Additionally, the area downstream of the existing box CMP, near the highway, would be vegetated to reduce erosion from the CMP's discharge.

The majority of the work would be completed in the dry. The stone sill entrance structure would be constructed last, which would divert water into the newly constructed secondary channel. The diversion would create a “first-flush” sediment effect, which should taper off quickly after water is introduced. Depending on the riverflow condition at the time of construction, a turbidity curtain may be used to minimize sediment release. If water level and velocity would result in unacceptable sediment levels under the CWA, then in-water construction would be limited to 4 hours per day to meet water quality requirements.

Construction access to the BLM property would be by way of the boat ramp access road from Highway 93. Existing trails created by OHVs crisscross the project area. Construction vehicles would generally follow these existing barren pathways. In locations where the channel does not follow existing roads, traffic would be held to a minimum to minimize disturbance of the surface soil and vegetation. Equipment parking, stockpiles, and other staging would be located within disturbed areas created by prior use. Any excess materials generated would be used to fill holes left by previous gravel borrow operations and filled to an elevation no higher than the adjacent ground line. Additional material would be taken from an existing gravel pit, located near the project site. Hauling plants, fencing, spur dikes, and entrance weir materials would require approximately 10 to 20 truck trips during the construction at the site. Ten to 30 trees larger than 2 inches (5 cm) in diameter may be removed during site construction.

# 8.0 ENVIRONMENTAL REVIEW REQUIREMENTS

## 8.1 Federal Statutes

### 8.1.1 National Historic Preservation Act (NHPA), As Amended (16 U.S.C. 470-470t, 110).

Under Section 106 of the National Historic Preservation Act, a Federal agency is required to assess the effects of its undertaking (*i.e.*, project) on cultural resources and to afford the Advisory Council on Historic Preservation the opportunity to comment on the undertaking prior to the start of work. (The implementing regulations for Section 106 are set forth in 36 CFR Part 800.) Section 106 requires Federal Agencies to identify if cultural resources are present within the boundaries of a proposed undertaking (*i.e.,* APE), to determine if they are eligible for listing in the NRHP, and to determine appropriate actions to take with regard to NRHP eligible properties. Federal agencies are also required to coordinate their proposed activities with appropriate parties (*e.g.*, SHPO, Indian tribes, *etc.*)

As required under Section 106 of the NHPA, the Corps is coordinating with the Idaho SHPO and other interested parties. A cultural resources report of findings for the proposed undertaking was submitted to the Idaho SHPO on March 18, 2004. The Corps has made a "No Adverse Effect" determination (letter dated June 30, 2004; see Appendix J for the proposed Salmon River Restoration Project and has requested SHPO concurrence. The SHPO response is pending. Work would not proceed until Section 106 compliance requirements are met.

### 8.1.2 Clean Air Act, As Amended (42 U.S.C. 7401 *et seq*.).

The project would comply with the Clean Air Act, as amended. The operation of construction vehicles and equipment would cause only temporary and minor effects on the quality of air. Dust would be kept at a minimal level with the aid of dust control measures. Mobile water sprinkling system(s) or unit(s) may be used to provide dust control. No chemical dust control agent would be used. As a requirement of Section 309 of the Clean Air Act, this DPR/EA would be provided to the U.S. Environmental Protection Agency (EPA) for their review and comment.

### 8.1.3 Clean Water Act, As Amended (33 U.S.C. 1251 *et seq*.).

Section 404 of the CWA requires evaluation of activities involving discharges of dredged or fill material into waters of the United States. The placement of structures identified in chapter 7 of this document would be subject to the requirements of the CWA. This project would meet the requirements of Nationwide Permit (NWP) number 27, Stream and Wetland Restoration Activities. It reads "…Activities in waters of the United States associated with the restoration of former non-tidal wetlands and riparian areas, the enhancement of degraded wetlands and riparian areas, and creation of wetland and riparian area." The DEQ certifies NWP No. 27 with three regional conditions and water quality certification conditions identified below.

The following information is provided to address these three regional conditions:

- **A person experienced and knowledgeable in river dynamics and stream restoration designs the project**. The project is a cooperative effort between the Corps, CSWCS, University of Idaho, Tribes, and other State of Idaho agencies. The Corps' design team contains a hydrologist and an engineer experienced in river dynamics and stream restoration.
- **The project is designed so that it does not create fish migration barriers and does not install intake structures.** Construction is scheduled to begin September 2004, during the low flow season, and is scheduled to avoid spawning, rearing, and migration periods, which typically occur from March to August.
- **Disturbed areas would be replanted with native vegetation and stabilized to minimize erosion using biodegradable materials.** Disturbance of existing vegetation would be avoided where possible. Riprap, in conjunction with bioengineering techniques, would be used for bank stabilization. Disturbance of wetland and riparian areas would be avoided, where possible.

A Section 404(b)(1) evaluation is not required, because one is performed for the NWP. This project has been coordinated with the Corps' Regulatory Division.

Section 401 of the CWA requires certification from the appropriate regulating agency (State, EPA, or Tribe) that there is a reasonable assurance that a proposed action can be conducted in a manner that would not violate applicable water quality standards. Issuance of a certification means that the certifying agency anticipates that the applicant's project would comply with applicable Federal or State effluent limitations, water quality standards, and other aquatic resource protection requirements under that certifying agency's authority. It is the responsibility of DEQ to issue 401 certification. Water quality certification in Idaho is subject to eight conditions, of which two do not apply.

The following information is provided to address these six conditions:

- **The project would not impair 303d listed streams.** The Upper Salmon River is not a 303(d) listed stream drainage and does not have an established TMDL. Sediment and temperature are identified as data gaps for the Salmon River in the Upper Salmon River Subbasin Assessment (DEQ, 2003). However, the project is expected to improve secondary channel connectivity and enhance the river's canopy cover, which would create long-term temperature improvement. The project would also provide streambank erosion protection and reduce erosion potential. The erosion and stream temperature improvements would provide additional capacity in the characteristics, which would help prevent the listing of the water body in the future.
- **The project is consistent with Bull Trout Conservation Plans.** The project is within a drainage identified in the Bull Trout Conservation Plan as one of the 59 key watersheds that contain bull trout populations. The project is consistent with the intent of the Bull Trout Conservation Plan (1996) and the Upper Salmon River Bull Trout Problem Assessment Draft (January 15, 1999). The project would not

alter connectivity with tributary streams and would create secondary channel habitat, which would be conducive for Bull Trout.

- **A person experienced and knowledgeable in river dynamics and stream restoration designs the project**. The Corps' design team contains a hydrologist and an engineer experienced in river dynamics and stream restoration.
- **The regional office of DEQ would be notified 10 days before project initiation.**
- **The project is designed so that it does not create fish migration barriers and does not install intake structures.** Construction is schedule to begin September 2004, during the low flow season, and is scheduled to avoid spawning, rearing, and migration periods
- **Disturbed areas would be replanted with native vegetation and stabilized to minimize erosion using biodegradable materials.** Disturbance of existing vegetation would be avoided where possible. Riprap, in conjunction with bioengineering techniques, would be used for bank stabilization. Disturbance of wetland and riparian areas would be avoided, where possible.

Since the project is located in bull trout habitat, a Section 401 water quality certification is required from Idaho Department of Ecology. Water quality certification has been provided for the project and is found in appendix J.

A storm water permit would be required under Section 402 of the CWA. The EPA is the National Pollutant Discharge Elimination System permitting authority for the State of Idaho. Construction activity that would disturb one or more acres and has the potential to have a discharge of storm water to a water of the United States must have a permit. These regulated discharges are broken into two categories: large and small. A large construction activity is one that would disturb, or is part of a common plan that would cumulatively disturb, 5 or more acres. Earth disturbing activities include all clearing, grading, excavation, and stockpiling activities. This project meets the requirements for a large construction activity that would disturb 5 or more acres. A Storm water Pollution Prevention Plan (SWPPP) is required to be developed that identifies BMPs that would be employed during the project to reduce storm water discharges. The Walla Walla District's District Engineer must sign the SWPPP, a notice of intent must be submitted to the EPA at least 7 days before the start of construction, and a copy of the signed SWPPP must be kept at the construction site(s) from the date of project initiation to the date of final stabilization.

**8.1.4 Endangered Species Act of 1973, as Amended** (16 U.S.C. 1531-1544). The Corps prepared a BA to evaluate the effects of the project to species listed on the Endangered Species List. A list of threatened and endangered species list, updated on March 5, 2004, is found in appendix H. The combined USFWS and the NOAA Fisheries BA is contained in appendix N. Formal consultation correspondence is found in appendix J.

In the BA, for USFWS species, the Corps has determined that the project *may affect, but is not likely to adversely affect* any of the listed species (bald eagle, bull trout, and yellow-billed cuckoo), *not likely to jeopardize the continued existence* of gray wolf, and *no effect* to Canadian lynx. The USFWS letter dated August 8, 2003, concurred with the Corps' impact determinations. Consultation correspondence from the USFWS is found in appendix J.

In the BA, for NOAA Fisheries species, the steelhead, and spring/summer chinook salmon determination was *likely to adversely affect*. The sockeye salmon determination *may affect, but is not likely to adversely affect*. The NOAA Fisheries letter dated October 17, 2003, concurred with the Corps' impact determinations. The BiOp establishes an incident take limit of 20 juvenile or 3 adult salmonids for in-stream activities and salvage operations for the life of the proposed project. The Corps is required to reinitiate consultation if the take limit is exceeded. The BiOp also identifies the seven terms and conditions, including their RPAs for alternative C. The NOAA Fisheries BiOp is found in appendix J.

**8.1.5 National Environmental Policy Act** [NEPA (42 U.S.C. 4321 *et seq.*)].
This DPR/EA has been prepared pursuant to the requirements of NEPA. No significant impacts have been identified in the EA. If no significant impacts are identified during the public review process, an EIS would not be required. If an EIS is not required, full compliance with NEPA would be achieved once the Finding of No Significant Impact (FONSI) is signed.

**8.1.6 Wild and Scenic Rivers Act** (16 U.S.C. 1278 *et seq*.).
The Upper Salmon River is not included on the Wild and Scenic Rivers inventory, according to the National Wild and Scenic Rivers System, December 1, 1992, or its 1998 update, published by the Department of the Interior and the Department of Agriculture, USFS. The information is also shown on their Web site at http://www.nps.gov/rivers/wildriverslist.html - id.

**8.1.7 Migratory Bird Treaty Act and Migratory Bird Conservation Act** (16 U.S.C. 701-715).
The proposed project would be conducted in such a manner that migratory birds would not be harmed or harassed. The proposed work would be outside the nesting season for most birds. Prior to vegetation removal, a qualified biologist would inspect the area to ensure there are no active nests, and vegetation removal would be delayed, if active nests were present. Removal of riparian vegetation suitable for nesting would be avoided, where possible. Any tree removal would be limited to before February and after July 1 to reduce impacts to nesting birds. Where nesting vegetation is removed, adequate riparian vegetation for nesting sites exists upstream and downstream from the project site. Increased vegetative planting and fencing to protect the survival of existing riparian vegetation would mitigate for riparian vegetation that is removed.

**8.1.8 8.1.8 Fish and Wildlife Coordination Act, as Amended** (16 U.S.C. 661 *et seq.*).

The proposed project is a Federal water resources development project. The project has been coordinated with the USFWS through telephone conversations. The USFWS has determined a Coordination Act Report is not required for this project and would provide comments, if any, to this DPR/EA during the public review comment period as the means to comply with the Act. The project complies with this Act.

**8.1.9 Federal Water Project Recreation Act, as Amended** (16 United States Code Annotated (U.S.C.A). 4612 *et seq.*).

The Federal Water Project Recreation Act (PL 89-72), as amended, requires that full consideration be given to opportunities for fish and wildlife enhancement in investigating and planning Federal water resources projects. The proposed project is a small ecosystem restoration project with the primary purpose of enhancing aquatic and riparian habitat. The project does not provide opportunities for public recreation, as the project and surrounding lands are privately owned.

**8.1.10 Rivers And Harbors Act** (33 U.S.C. 403)

The Rivers and Harbors Act of 1899 prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the United States in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the Army. This act is not applicable to the proposed project, because none of the waters are considered navigable.

**8.1.11 Watershed Protection and Flood Prevention Act, as Amended** (16 U.S.C. 1001 *et seq.*).

The Watershed Protection and Flood Prevention Act, PL 83-566, is commonly known as the Small Watershed Program. The USDA-NRCS administers this program. The program authorizes Federal assistance to local organizations for planning and carrying out projects in watershed areas for conservation, use of land, and water and flood prevention. This project is not a product of the Small Watershed Program, therefore, this act is not applicable to this project.

**8.1.12 Farmland Protection Policy Act** (7 U.S.C. 4201 *et seq*.).

The Farmland Protection Policy Act (PL 97-98, Sec. 1539-1549) requires identification of proposed actions that would affect any lands classified as prime and unique farmlands. The proposed project would not affect farmland classified as prime and unique.

**8.1.13 The Resource Conservation and Recovery Act (RCRA)** (42 U.S.C. 6901 *et seq.*).

The RCRA was enacted in 1976 to address the issue of how to safely manage and dispose of municipal and industrial waste; regulate underground storage tanks (USTs) that store petroleum or hazardous substances; establish a system for managing solid (primarily nonhazardous) waste, including household waste; and set forth the framework for EPA's comprehensive waste management program. No abandoned waste has been observed during project site visits. Abandoned or buried hazardous waste or pesticides, if discovered during construction, would be managed in accordance with RCRA or CERCLA requirements, as applicable. Contractor hazardous materials and waste would be managed in accordance with RCRA requirements. The project complies with this Act.

**8.1.14. Magnuson-Stevens Fishery Conservation and Management Act (MSA)** (16 U.S.C. 1801).

The PL 94-265 as amended through October 11, 1996, Title 16 Chapter 38 PL 104-267, the Sustainable Fisheries Act of 1996 (16 U.S.C. 1855), amended the Magnuson-Stevens Act to establish new requirements for essential fish habitat (EFH) descriptions in Federal fishery management plans and to require Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Magnuson-Stevens Act §3)." The EFH for anadromous fisheries means those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (*i.e.*, properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation).

The Magnuson-Stevens Act requires consultation for all actions that may adversely affect EFH, and it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. The consultation requirements of section 305(b) of the Magnuson-Stevens Act provide that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.
- NOAA Fisheries shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH.
- Federal agencies shall, within 30 days after receiving conservation recommendations from NOAA Fisheries, provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The BA addressed EFH issues and the NOAA Fisheries letter forwarding the BiOp (appendix J) states the BiOp also contains consultation on EFH pursuant to section 305(b) of the MSA. Therefore, the project complies with this Act.

## 8.2 Executive Orders

### 8.2.1 Executive Order 11988 (as amended), Flood Plain Management

May 24, 1977.
The objective of Executive Order 11988, is to ensure avoidance to the extent possible of any adverse impacts, short and long term, associated with the occupancy and modification of the base flood plain whenever there is a practical alternative. See appendix F for an analysis of the project impacts on the existing flood plain condition.

Custer County participates in the National Flood Insurance Program. A FEMA FIS was completed in March 4, 1988, for Custer County, Idaho, and unincorporated areas (community numbers 160053, City of Challis, Idaho, and unincorporated number 160211). Because the proposed work lies within a detailed FIS, a "no-rise condition" of the floodway elevation would be maintained. An analysis was performed that showed the proposed design does not decrease the conveyance of the base flood plain.

The project is designed to improve stream conditions for fish and restore some of the natural function of the flood plain. The project is consistent with the objective of Executive Order 11988 because it does not decrease the carrying capacity of the base flood plain. Therefore, the project complies with the Executive Order.

**8.2.2 Executive Order 11990, Protection of Wetlands**, May 24, 1977.
The purpose of this project is to restore/enhance aquatic and riparian habitat. Wetlands that would be impacted by this project are described in section 6.2.6, Wetlands. No net loss of wetlands is anticipated. The quality of the Hot Springs wetland would be improved by removing the irrigation inflow. The streamflow conditions would be changed to closely match the pre-irrigation and natural conditions. Some of the wetlands on the Pennal Gulch site would be converted back to the original riverine condition, which existed before the disconnection of the secondary channel.

**8.2.3 Executive Order 12898, Environmental Justice**, February 11, 1994.
Executive Order 12898 directs every Federal agency to identify and address disproportionately high, adverse human health or environmental effects of agency programs and activities on minority and low-income populations. The project does not involve constructing a facility that would discharge pollutants or contaminants, and thus no human health effects would occur. This project would not have disproportionately effects on minority and low-income populations. Therefore, the project complies with this act.

## 8.3 Executive Memorandums

The Council for Environmental Quality (CEQ), Memorandum dated August 11, 1980, Analysis of Impacts on Prime and Unique Agricultural Lands in Implementing NEPA. No prime or unique farmland would be impacted by this project. Access routes would not cross farmlands that are classified as prime and unique.

### 8.4 State and Local Permits

The sponsor is responsible for all required state and local permits. All activities would occur in compliance with environmental requirements of the State of Idaho and Custer County.

A stream alteration permit is issued by IDWR for stream crossings or streamside work conducted below the average high watermark of the stream. As a Federal entity, the Corps is not required to obtain a state permit. However, the Corps would work with IDWR to ensure that the project was performed in a manner consistent with stream alteration permit requirements. The work would be planned and accomplished to have the least environmental negative impact, and disturbed areas would be replanted to minimize erosion.

Locations situated below the ordinary line are claimed by the State of Idaho. These areas should be secured by the sponsor for project purposes by applying to IDWR for a stream alteration permit. The permit would carry the concurrence of the Idaho Department of Lands (IDL) and satisfies the requirement of both agencies in one document.

A State water permit may be required to acquire the water rights for irrigating plantings/riparian areas. State law would control the use of any water from the river for watering plantings. The local sponsor must either:

- apply for and receive a permit from the state,
- pay the landowner for use of water from existing water rights, or
- contract for irrigation by way of water truck.

Additional negotiations with the landowners are needed in order to determine if option 2 above is viable. If options 1 and 2 were determined to be not negotiable or feasible for the local sponsor, option 3 would be used and included as part of the construction contract and sponsor O&M costs.

Cull logs and root wads would be collected for use in stabilizing streambanks. Any forest practice activities associated with collecting these materials would comply with the Idaho Forest Practices Act, Rules and Regulations administered by the IDL.

# 9.0 CUMULATIVE EFFECTS

The National Environmental Policy Act and the CEQ regulations require Federal agencies to consider the cumulative impacts of their actions. Cumulative impacts are defined as the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what other agency or person undertakes the other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1506.7). The environmental resources considered for this analysis are water quality, aquatic habitat, and riparian habitat.

## 9.1 Past Actions

Past actions contributing to the degraded Upper Salmon River ecosystem include mining, grazing/farming practices along the river, roadway development, flood protection berms and riprap, altered drainage areas, and construction of residences. These actions occurred in a piecemeal fashion over the course of several decades. The cumulative result of these activities has resulted in straightening the channel and isolating secondary channels for a significant amount of the river's 12-mile Round Valley reach. The channel straightening has skewed the sediment budget load and most likely increased the displacement of gravels downstream.

The effect of these past actions has been to degrade water quality, primarily raising average and maximum water temperatures, and increasing the turbidity and sediment load of the river. These have also reduced the quantity and variety of aquatic species and the amount of aquatic habitat, as well as the quality and quantity of riparian habitat.

## 9.2 Present and Reasonably Foreseeable Future Actions

Present and reasonably foreseeable future actions that would have an effect on these same resources include the following:

- The BLM OHV trail system.
- A number of BPA funded mitigation projects in the watershed, mostly in the Lemhi drainage.
- Some restoration work proposed for Morgan Creek and other tributaries to the Upper Salmon River.
- Irrigation fish screening efforts in the general area proposed by the Bureau of Reclamation (BOR).
- Additional home site developments at unspecified locations.
- Continued overgrazing in riparian locations.
- Continued riprapping of river and streambanks.
- Continued blockage of secondary channels.

The BPA projects, Upper Salmon River restoration work, and fish screening efforts are all expected to provide positive impacts to the environmental resources. The projects would have localized specific terrestrial and aquatic habitat effects within their project area. Overall and broad-reaching benefits to the larger riverine system, however, would be minimal. However, in total and in combination with the 12-mile reach project, these incremental habitat improvements should prove beneficial to ESA listed fish species. The negative impacts to the environmental resources include:

- Immature replanted vegetation during early stages of post-construction.
- Riparian tree and vegetation removal.
- Increased turbidity during in-stream work.

Home construction or other similar development near the river corridor could have potentially adverse effects on water quality, aquatic habitat, and riparian habitat. These effects may include:

- Higher sediment loads from storm water runoff from private roads that have altered or increased surface drainage into the river or from poorly managed irrigation practices.
- Increased chemicals in the river from storm water runoff from yards or livestock pastures.
- Increased damage to the riverbank or removal of riparian vegetation due to unmanaged livestock grazing.

As landowners continue to establish and maintain hardened bank protection and straighten the river's course, river downcutting will occur. Downcutting further separates the main river from the surrounding flood plain, cuts off secondary channel flow, and increases the frequency and magnitude of eroded banks. Additional erosion detrimentally affects water quality through increased sediment load and creates more difficult conditions for developing and establishing riparian habitat.

The BLM OHV trail system has the potential to affect water quality by increasing the sediment load in the river from storm water runoff. Depending on the proximity of the trail to the river, there is potential for human access to damage and negatively affect sensitive riparian habitat.

### 9.3 Project Impact

The proposed ecosystem restoration project would have localized specific terrestrial and aquatic habitat effects within the project area. Broad reaching benefits to the larger riverine system, however, would be minimal. The negative impacts to the environmental resources include:

- Immature vegetation, during early stages of post-construction where construction required vegetation removal, could impact water quality and aquatic and riparian habitat due to inability to hold soil and prevent erosion, lack of canopy shade, and vegetative cover.

- Riparian tree removal could impact riparian habitat.
- Turbidity increase during in-stream work could affect water quality and aquatic habitat.

For the environmental restoration measures being proposed under this project, positive cumulative impacts include:

- Improved water quality through reduced velocities and stabilization of the channel.
- Long-term reduction of erosion and sediment load.
- Long-term increase in vegetation and re-establishment of riparian habitat.
- Creation of additional aquatic habitat for steelhead and other species.
- Increased flooding frequency of the flood plain.
- Increased perennial flow in secondary channels.
- Localized reduced water temperatures.
- Benefits to all fish and wildlife species dependant on aquatic and riparian habitat.

There is positive impact by constructing five restoration sites, which increases the biological benefits in a cumulative fashion. Furthermore, there is potential that as local landowners observe and assess the results and success of this project effort, similar projects may be conducted in the future, increasing the potential positive cumulative effect. This project would also supplement other similar projects being conducted through out the Upper Salmon River Basin.

The cumulative negative effects of several sites with immature vegetation, in their early stages post-construction, are unlikely to create any significant detrimental impacts. The remaining undisturbed and newly planted vegetation, together with undisturbed habitat located both up and downstream of the project sites, should provide adequate habitat to support the existing aquatic and riparian species. Once the vegetation matures for these sites, they would combine to provide a more continuous uniformly, vegetated riparian buffer zone for the Round Valley reach, resulting in beneficial aquatic and riparian habitat cumulative effects.

A small amount of riparian trees would be removed but would be mitigated by replanting disturbed areas. The project would result in a net increase in riparian vegetation.

Secondary channel efforts would employ erosion control measures and the construction would be phased over a 3-year period. Therefore, any major flood event should not trigger a cumulative erosion effect downstream of the project sites. Each project site is designed to provide bank protection, flood capacity, and, where secondary channels are reconnected, to reduce the river’s energy. These factors make cumulative water quality impact unlikely.

## 9.4 Cumulative Impact

The cumulative impact of past, present, and reasonably foreseeable future actions would not be significant. The various actions would occur at physically separated locations. The actions, while individually having minor effects on water quality, aquatic habitat, and riparian habitat would not combine into a significant effect. Water quality effects would not be expected to trigger any TMDL requirements on the reach. Riparian habitat, while affected in specific locations, would be short and have no broad-reaching impacts. Adequate, undamaged vegetation will be available to support the wildlife community. Likewise, aquatic habitat, while impacted by specific in-water work, would be short and have no broad impacts. Adequate, unimpaired aquatic habitat would be available to support the aquatic community. While some property would be flooded more frequently, it would be located within project easement boundaries. The project does not increase the floodway or 100-year (1 percent chance) flood plain boundaries. Consequently, the project, together with past, present, and reasonably foreseeable future actions, is not expected to have a significant impact on water quality, aquatic habitat, or riparian habitat.

## 10.0 PREFERRED ALTERNATIVE

Alternative C, Naturalized Constructed Solution, is the preferred alternative. Based on the existing conditions and affected environment discussion (provided in chapters 5 and 6, of those alternatives meeting the project goals and objectives), alternative C does not create adverse environmental or cumulative impact, is not the most expensive to build, is aesthetically aligned with its surroundings, and meets the sponsor's and landowners requirements. In summary, the preferred alternative consists of the following attributes:

### 10.1 Phase 1 Construction

Construction of Phase 1 would begin in August 2005. Table 10-1 identifies the tasks that would be completed during phase 1 at site 3.

**Table 10-1 Summary of Attributes Proposed for the Challis Hot Springs Site 3.**

| Proposed Work and Purpose | No. of Locations | Approximate Total Size |
|---|---|---|
| Grade and excavate new settling pond to reduce sediment in irrigation runoff and create semi-wetland habitat. | 1-S | 6 acres |
| Construct channel from the wetland to the river to take reduced sediment water back into the Salmon River.<br>- Install fish screen on outlet for this channel. | 1-S<br><br>1-S | 400 ft/ 122 m<br><br>n/a |
| Construct fence along east, west, and main channels of the creek to protect riparian habitat for rearing. | S & N | 15,000-17,000 ft<br>4572-5182 m |
| Excavate an old side channel along the Salmon River to re-establish perennial flows for rearing habitat. | 1-S | 700-800 ft<br>213-244 m |
| Plant trees and shrubs: along east, west, and main channels of the creek and the new wetland to improve rearing and riparian habitat.<br>Plant along main channel of the Salmon River to improve riparian habitat. | S & N<br><br>1 -S | 12,000-14,000 ft<br>3657-4267 m<br>4,000 ft<br>1219m |
| Mature trees may be removed during construction; none would be removed next to the river. | unknown | 7-10 trees |
| Grazing management plan for easement area | S & N | 38-58 acres |
| **<u>East channel</u>**: Construct gravel dam/riffles to form jump pools.<br>- Construct cobble beds for juvenile cover from predators.<br>- Replace CMP near hay yard with 46- by 60-inch (117- by 152-cm) pipe arch for fish passage.<br>- Construct fish screen at mouth of irrigation ditch.<br>- Excavate vertical banks to create overflow bench on both banks.<br>- Construct water gap in fence for stock watering. | 2 - S<br>2 - S<br>1 – S<br><br>1 – S | 200 ft/61 m<br>400 ft/122 m<br>30-40 ft/ 9-12 m<br><br>n/a<br>300 ft/91 m<br>8-16 ft/ 2-5 m |
| **<u>West channel</u>**: Deepen thalweg, rearing habitat and predator protection.<br>- Gravel dam and riffles to form jump pools.<br>- Replace existing CMP with 46- by 60-inch (117- by 152-cm) pipe arch | 1-S<br><br>3-S<br>1-S<br>3-S | 200 ft/61 m<br><br>300 ft/91 m<br>20-30 ft/6-12 m<br>600 ft/183 m |

| Proposed Work and Purpose | No. of Locations | Approximate Total Size |
|---|---|---|
| - Construct cobble beds for juvenile cover from predators.<br>- Construct two water gaps in fence for stock watering. | 2-S | 16-32 ft/5-9 m |
| **<u>Main channel</u>**:<br>- Install flume and diversion structure to divert irrigation runoff into creek or into the new wetland.<br>- Install 46- by 60-inch (117- by 152-cm) pipe arch to convey creek flow under the irrigation flume.<br>- Remove CMP near horse barn.<br>- Install fish screen on domestic irrigation inlet.<br>- Excavate existing pond, new channel, and wetland fringe for new creek alignment.<br>- Construct water gap in fence for stock watering. | <br>1-S<br><br>1-S<br><br>1-S<br>1-N<br>1-N<br><br>1-S | <br>40-50 ft/12-15 m<br><br>40-60 ft/12-18 m<br><br>20 ft/6 m<br>n/a<br>1,500-1,800 ft<br>457-549 m<br>8-16 ft/2-5 m |

The designated "S" and "N" are used respectively for the southern and northern landowners in the "No. of Sites" column. The information is separated into the east, west, and main channels of Challis Hot Springs Creek.

## 10.2 Phase 2 Construction

Construction of phase 2 would begin in December 2006. Tables 10-2, 10-3, and 10-4 identify the tasks that would be completed during phase 2 at sites 1, 4, and 5.

**Table 10-2 Summary of Attributes Proposed for the Dunfee Slough Site 1.**

| Proposed Work and Purpose | No. of Locations | Approximate Total Size |
|---|---|---|
| Construct rock sill to control deposition into the side channel;<br>- construct a channel to connect the river with an existing side channel/pond/slough, and<br>- deepen ponds and channels between them. | 1<br>1<br>2 - 5 | 50-80 ft/15-24 m<br>200-400 ft/61-122 m<br>300–700 ft/91-213 m<br>[1,500 – 2,500 cy (1146.8 and 1911 $m^3$)of material removed] |
| Install a 4-ft-diameter (1.2-m-diameter) CMP at side channel entrance with an 18-inch-square (46-cm-square) orifice plate to control flow. | 1 | 40 ft/12 m |
| Rearrange existing pond spillway rock and install large woody debris to enable fish passage and create habitat. | 4 | 300 ft/91 m |
| Install fish barriers on western side channel/pond complex. | 2 | n/a |
| Plant trees and shrubs to improve side channel rearing habitat. | 4 | 40–60 acres |
| Build fence at the north and south property lines and along the northern section of the side channel to protect riparian vegetation and improve rearing habitat. | 1 | 2,500 ft/762 m |
| Grazing management plan for easement area | 1 | 15-20 acres |
| Mature trees removed during construction; none would be cut next to the river. | unknown | 4-10 trees |

**Table 10-3 Summary of Attributes Proposed for the Pennal Gulch Site 4.**

| Proposed Work and Purpose | No. of Locations | Approximate Total Size |
|---|---|---|
| Construct fence to exclude cattle from wetland and rearing habitat. | 1 | 5,500 ft/1676 m |
| Construct water gaps in the fence for livestock grazing from the other side of the fence. | 3 | 300 ft/91 m |
| Plant willow and trees along the side channel and place cottonwood logs for bank protection. | 1 | 350 ft/107 m |
| Breach the levee about 700 ft upstream from Sportsman's Access to install a 4-ft-diameter (1.2-m-diameter) CMP with an 18-inch-square (46-cm-square) orifice to carry flows to a new side channel.<br>- Construct rock sill in river at the entrance of the breached levee and CMP to direct flows to the new side channel and reduce deposition of material at the entrance to the channel. | 1<br>1 | 20 ft/6 m<br>50–80 ft/15-24 m |
| - Construct new channel from the breached levee along the edge of an existing wetland and connect with an existing slough.<br>- Build levee 1.5 ft high between new channel and wetland to maintain sediment transport and temperature. | 1<br>1 | 1,300 –1,700 ft 396-518 m<br>1,000 ft/305 m |
| Install a 46- by 60-inch pipe (117- by 152-cm) arch on Sportsman's Access road to connect the new side channel to the existing slough and relic channels for fish passage. | 1 | 20 ft/6 m |
| -Construct a high-flow channel with rock fill section on the road into the Sportsman's Access. | 1 | 80 ft/24 m |
| - Construct barbs and sills in the new channel to protect the banks and form riffles and pools for rearing habitat. | 3 | 150-200 ft/46-61 m |
| Install a 4-ft-diameter (1.2-m-diameter) CMP with an 18-inch-square (46-cm-square) orifice in the Sportsman's Access levee;<br>- Excavate the old side channel below this CMP to make a natural transition from the river to the old side channel.<br>- Lower the levee at the Sportsman's Access by 3 ft to reconnect the flood plain. | 1<br>1<br>1 | 40 ft/12 m<br>800–900 ft/244-274 m<br>100 ft/30 m |
| - Install anchor logs on the bank of the old side channel downstream from the Sportsman's Access; plant banks with willow for bank protection. | 2 | 300–500 ft/91-152 m |
| Clear vegetation for temporary equipment access between work sites. | 1-3 | 3,000 –4,000 ft/ 914-1219 m |
| Mature trees removed during construction; none would be removed next to the river. | unknown | 5-10 trees |
| Grazing management plan for easement area | 1 | 77 acres |

**Table 10-4 Summary of Attributes Proposed for the Highway 93 Bridge Site 5.**

| Proposed Work and Purpose | No. of Locations | Approximate Total Size |
|---|---|---|
| Excavate and reconnect old side channel to the river with point bars and willow layering. | 1 | 1,800 ft/549 m |
| Install a rock sill at the upstream end of the new side channel to reduce deposition of transported materials in the river. | 1 | 100-120 ft/30-37 m |
| Construct a french drain from side channel to a refuge pool. | 1 | 75 ft/23 m<br>50 x 100 ft |
| Install barbs and sills to create scour pools | 4 | 200 ft/61 m |
| Point bar shaping on outer banks of the new side channel with willow plantings for bank protection. | 5 | 500–700 ft/152-213 m |
| Construct a levee with openings to allow flood plain connection along the new side channel. | 1 | 500-700 ft/152-213 m |
| Install 46- by 60-inch (117- by 152-cm) pipe arch under the access road. | 1 | 30-40 ft/9-12 m |
| Build hardened section of access road to handle overbank flow in the high-flow channel when flows exceed capacity of the CMP. | 1 | 100 ft/30 m |
| Construct a high-flow channel for the new side channel. | 1 | 500 ft/152 m |
| Install boulder fence with metal posts to control vehicle access on either side of boat ramp road. | 1 | 100 ft/ 30m |
| Build a jack fence along the fill slope of Highway 93 and along the edge of the riparian woodland and down the boat access road. | 1 | 2,000-2,300 ft/ 610-701 m |
| Plant trees and shrubs along the side channel and below the box CMP under Highway 93. | 3 | 600 ft/183 m |
| Install rock barbs on the Highway 93 embankment for protection from future floods. | 1 | 3-10 |
| Mature trees removed during construction; none would be removed next to the river. | unknown | 10-30 trees |

## 10.3 Phase 3 Construction

Construction of phase 3 would begin in December 2007. Table 10-5 identifies the tasks that would be completed during phase 2 at site 2.

**Table 10-5 Summary of Attributes Proposed for the One Mile Island Site 2.**

| Proposed Work and Purpose | No. of Locations | Approximate Total Size |
|---|---|---|
| Plant trees and shrubs along existing secondary channel to provide rearing habitat. | 2 (both banks) | 1,900 ft/579 m |
| Grade slope of vertical river bank between existing barbs on the island along the east bank of the river; install logs at the foot of the bank and plant willows. | 6 | 3,200-3,800 ft 975-1158 m |
| Build jack fence; protect side channel rearing habitat or main channel, grazing excluded. | 1 | 3,000-3,500 ft 914-1067 m |
| Grazing management plan for easement area | 1 | 30 acres |
| Mature trees removed during construction; none would be cut next to the river. | unknown | 2-5 trees |

## 11.0 IMPLEMENTATION SCHEDULE

The schedule below provides details for implementation. Construction is expected to take place beginning in the summer of 2005, in compliance with the agency-approved in-water work window (September 1 to March 1), and complete by the end of 2008.

The following list identifies the milestones for the project design and construction schedule.

| Milestone Action | Date ** |
|---|---|
| Draft EA complete | **Sept. 2003** |
| EA complete | **Oct. 2004** |
| FONSI signed * | Dec. 2004 |
| Plans and Specifications complete | July 2005 |
| Project Cooperative Agreement signed | June 2005 |
| Award Construction Contract - Phase 1 | Sept. 2005 |
| Construction Start – Phase 1 | Oct. 2005 |
| Real Estate complete - Phase 2 | Sept. 2006 |
| Construction Start – Phase 2 | Dec. 2006 |
| Construction Start – Phase 3 | Dec. 2007 |
| Project Completion (continuing construction and monitoring) | June 2010 |

* If a FONSI is determined to be appropriate and no significant environmental impacts are identified.
** Bolded Dates are completed

## 12.0 PROJECT COST AND REAL ESTATE

### 12.1 Project Cost

The project cost would be shared between the Corps and the local sponsor at a 65/35 percent split. Part of the sponsor's cost includes all real estate and work in-kind costs. The local sponsor is also responsible for O&M of the project after construction completion, which would include invasive weed abatement, and periodic monitoring. See appendix K for additional monitoring plan details and chapter 13 for a description of O&M requirements.

Table 12-1 provides the fully funded project cost for the recommended alternative estimated at $7,517,000 (see appendix L). This includes land, easements, rights-of-way, relocation, and disposals (LERRD; real estate costs). Plans and specifications cost is calculated as a percentage (20 percent) of construction cost. The incremental cost benefit analysis is provided in appendix E.

**Table 12-1 Federal and Non-Federal Project Cost Requirements (Fully Funded).**

| (x $1,000) | | | | | | | Federal Funding Needs | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Totals | Non Fed | Fed | | Prior Years | FY 03 | FY 04 | FY 05 | FY 06 | FY 07 |
| | | | | | | | | | | |
| DPR/EA [1/] | $1,075 | $ 232[1/] | $ 843 | | $713 | $324 | $ 38 | | | |
| Plans & Specs | $ 804 | $ 0 | $ 804 | | | | $ 400 | $ 294 | $ 93 | $ 17 |
| Construction | $4,701 | $1,462 | $3,239 | | | | $2,208 | $ 597 | $ 843 | $1,053 |
| LERRD | $ 937 | $ 937 | | | | | $ 497 | $ 195 | $ 245 | |
| Totals | $7,517 | $2,631 | $4,886 | | $713 | $324 | $3,143 | $1,086 | $1,181 | $1,070 |
| | | | | | | | | | | |
| Non-Federal Cost Breakdown: | | | | | | | | | | |
| LERRD | | $ 937 | | | | | | | | |
| Cash | | $1,314 | | | | | | | | |
| Work In-Kind [2/] | | $ 380 | | | | | | | | |
| Total | | $2,631 | | | | | | | | |
| | | | | | | | | | | |
| Annual O&M | | $15 | | | | | | | | |

[1/] Credit per WRDA 2000 legislation

[2/] Non-Fed cost includes estimated in-kind creditable costs during Feasibility as allowed by WRDA 2000.

### 12.2 REAL ESTATE

The project would be located at five discontinuous sites along the Upper Salmon River. Beginning at the site furthest upstream and proceeding downriver, they are identified as site 5, site 1, site 2, site 3, and site 4. Grazing management easements may also be exercised where landowners are agreeable. While fee acquisition is preferred for this project for private property, Corps Headquarters has approved the use of the perpetual non-standard ecosystem restoration easement (appendix B).

**Table 12-2 Real Estate Data Table.**

| | Property Quad Location | Acreage (acres) | Real Estate Easement |
|---|---|---|---|
| Dunfee Slough Site 1 | Section 3, Township 13 North, Range 19 East, W.M | 93.53<br>6.40<br>5.26 | Ecosystem Restoration easement, Road easement,<br>Temporary Work Area easement,<br>IDL Stream Alteration Permit. |
| One Mile Island Site 2 | Section 35, Township 14 North, Range 19 East, W.M | 104.86<br>7.51 | Ecosystem Restoration easement, Road easement,<br>IDL Stream Alteration Permit. |
| Hot Springs Site 3 | Section 23, 25 and 26, Township 14 North, Range 19 East, W.M | 188.86<br>1.64<br>20.64 | Ecosystem Restoration easement, Road easement,<br>Temporary Work Area easement,<br>BLM Cooperative Agreement,<br>IDL Stream Alteration Permit. |
| Pennal Gulch Site 4 | Section 14, Township 14 North, Range 19 East, W.M | 74.38<br>1.75<br>11.12 | Ecosystem Restoration easement, Road easement,<br>Temporary Work Area easement,<br>BLM Cooperative Agreement,<br>IDL Stream Alteration Permit. |
| Hwy 93 Bridge Site 5 | Section 10, Township 13 North, Range 19 East, W.M | 14.39<br>0.16<br>4.41 | Ecosystem Restoration easement, Road easement,<br>Temporary Work Area easement,<br>BLM Cooperative Agreement,<br>Idaho DOT permit,<br>IDL Stream Alteration Permit. |
| Spoils Area | Section 22, Township 14 North, Range 19 East, W.M | | Temporary Work Area easement. |

None of the sites have any known mineral deposits of commercial value, nor is there any known presence of hazardous material. No displacements or resettlements are anticipated under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (PL 91-646). While the overall extent of facility/utility relocation has yet to be determined, there are no known utility relocations. The total project real estate costs, including contingencies, are estimated to be $1,038,100.

# 13.0 OPERATION AND MAINTENANCE REQUIREMENTS

The sponsor is required to perform O&M for the life of the project. Any deficiency discovered would be the local sponsor's responsibility to correct. An O&M manual would be prepared for the sponsor's use when the project is constructed. This would consist of invasive weed abatement, removal of excess sediments, and repair of structures and fences. This work may also include periodic monitoring (appendix K), such as photo point assessment, and stream temperature monitoring. The results of this monitoring would be used to fine-tune the stream geometry to ensure efficient transport of sediment through the project reach and dynamic equilibrium of the stream system. Maintenance activities are expected to be minimal. See appendix D for additional details on the GMP.

# 14.0 FINANCIAL ANALYSIS

The local sponsor intends to use funds designated for ESA fish habitat improvement from BPA. Prior to entering into the Plans and Specifications phase of this project, the Sponsor will obtain a commitment letter from BPA concerning such funding, or confirm availability of funding from other sources. As such, the sponsor is capable and willing to provide its 35-percent cost share for this project.

# 15.0 FINDINGS AND DETERMINATION

This DPR demonstrates the benefit to aquatic species, specifically anadromous ESA listed fish species, using the features identified and evaluated in this study for the preferred alternative (chapter 7).

## 16.0 RECOMMENDATIONS

Project approval by the Corps, Northwestern Division, includes a recommendation to approve the DPR and EA. Approval of the DPR would allow proceeding to prepare plans and specifications for the preferred alternative, as identified in chapter 7 of this study. In parallel, the Corps would also develop a project cooperation agreement with the sponsor, pursuant to project construction and completion. The total fully funded project cost is estimated at $7,456,000.

# 17.0 CONSULTATION AND COORDINATION

This aquatic ecosytem restoration project has been coordinated with applicable agencies including the USFWS, NOAA Fisheries, DEQ, IDFG, the Idaho State Historical Society (ISHS), and IDWR.  Additionally, the EA has been distributed to interested Federal and State agencies, groups, local governments, and the public for review and comment.

Formal government-to-government consultation is being undertaken with the Shoshone-Paiute Tribes of the Duck Valley Reservation; Shoshone-Paiute Business Council, and the Shoshone-Bannock Tribe of the Fort Hall Reservation; Fort Hall Business Council.

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